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Abstract

ARTHUR, J. R., AND H. P. ARAI. 1984. Annotated checklist and bibliography of parasites of herring (*Clupea harengus* L.). Can. Spec. Publ. Fish. Aquat. Sci. 70: 26 p.

The literature containing original observations on the parasites of herring (*Clupea harengus* L.) throughout its worldwide distribution is summarized in the form of annotated Parasite–Host and Host–Parasite checklists with accompanying bibliography. The Parasite–Host checklist, arranged on a taxonomic basis, summarizes records for over 80 identified species of parasites (9 Protozoa, 13 Monogenea, 21 Digenea, 8 Cestoda, 10 Nematoda, 12 Acanthocephala, 2 Arguloidea, 6 Copepoda, 1 Agnatha) reported from herring, and includes information on numerous other parasites for which specific identity is unknown. Included are the currently recognized scientific names of the parasites, any synonyms occurring in the literature, site of occurrence (location) in the host, subspecies of herring from which the parasite has been reported, summary of the recorded distribution of the parasites in herring, and the published source for each host and locality record. Where necessary, remarks and footnotes dealing with such topics as systematics, erroneous reports, and misidentifications are included. The Host–Parasite list summarizes the species of parasites reported from each subspecies of herring and their geographic distributions.

Résumé

ARTHUR, J. R., ET H. P. ARAI. 1984. Annotated checklist and bibliography of parasites of herring (*Clupea harengus* L.). Can. Spec. Publ. Fish. Aquat. Sci. 70: 26 p.

Les auteurs résument les ouvrages contenant les données originales sur les parasites du hareng (*Clupea harengus* L.), dans toute son aire de distribution. Ces données sont présentées sous forme de listes annotées parasite-hôte et hôte-parasite et sont accompagnées d'une bibliographie. La liste parasite-hôte, disposée selon le rang taxonomique, couvre plus de 80 espèces de parasites identifiés (9 Protozoa, 13 Monogenea, 21 Digenea, 8 Cestoda, 10 Nematoda, 12 Acanthocephala, 2 Arguloidea, 6 Copepoda, 1 Agnatha), signalés chez le hareng, et comprend des données sur un grand nombre d'autres parasites dont l'identité est inconnue. Sont inclus les noms scientifiques courants, les synonymes relevés dans les ouvrages, le lieu où on le retrouve chez l'hôte, la sous-espèce de hareng parasité, un résumé de la répartition signalée des parasites chez le hareng et la source de chaque donnée sur l'hôte et l'emplacement. Au besoin, des remarques et des notes en bas de page au sujet de la systématique, de faux signalements et d'identifications erronées sont ajoutées. La liste hôte-parasite résume les espèces de parasites signalés chez chaque sous-espèce de hareng et leur répartition géographique.

Introduction

Because of its great historical importance as a food fish and its wide distribution and great abundance throughout coastal Holarctic waters, the herring (*Clupea harengus* L.) has probably received more parasitological attention than any other species of marine fish. Since the first published account of the investigations of van Leeuwenhoek (1697), almost 300 papers and manuscripts spanning four centuries have recorded original observations on the parasites of herring. Recorded in this literature are over 80 species of parasites with numerous other reports under specific names for which the true identity cannot be determined. As no complete summary of the records of herring parasites has appeared since von Linstow (1878, 1889) and as the parasite fauna of herring has now been well documented in all major areas of its geographical distribution, it appears timely, as an aid to subsequent workers, to bring together and briefly review, in the form of an annotated checklist and bibliography, the literature reporting original observations on the parasites of herring.

The earliest published records and descriptions of parasitic helminths infecting herring were based on collections made from Atlantic herring (*Clupea harengus harengus* L.) originating from the northeastern Atlantic Ocean and Baltic Sea. These early records, by such workers as Martin (1760), Linnaeus (1767, 1789), Walch (1778), Bloch (1782), Fabricius (1794), and Zeder (1800), among others, are mainly of historical interest, the descriptions being too inadequate by today's standards to permit positive recognition of the species of parasites involved. Additional reports, contained primarily in taxonomic studies of restricted groups of helminths, were added by 19th century parasitologists, among them Bellingham (1844), Cobbold (1866), van Beneden (1871) and Olsson (1866–67, 1867–68, 1893). In the latter part of the 19th century, von Linstow (1878, 1889) was able to list 12 species of parasites (1 Monogenea, 3 Digenea, 2 Cestoda, and 6 Nematoda) occurring in herring. Since that time the parasite fauna of Atlantic herring has been well investigated throughout most of its range. In the Baltic Sea, major studies are those of Schneider (1902b, 1903), Forssell (1905), Markowski (1933), Lundström (1942), Petrushevsky (1957), Getsevichyute (1958), Arro (1964), Reimer (1970), Rokicki (1973, 1975), Grabda (1974a, b), and Gaevskaya (1977, 1979). In the Aral Sea the parasite fauna of herring transplanted from the Baltic has been examined by Osmanov (1971) and in the Barents Sea Atlantic herring have been studied by Polyansky (1955). In the northeastern Atlantic Ocean, major studies include those of Odhner (1905), Nicoll (1907, 1910, 1915), Kabata (1963), Khalil (1969), Davey (1972a), and Reimer and Jessen (1972). In the northwestern Atlantic Ocean, the parasite fauna of herring has been extensively studied, major contributions being those of Linton (1901a, 1924, 1940), Stafford (1904, 1907), Cooper (1915), Heller (1949), and Sindermann (1961a, 1963, 1965). Dollfus (1956) summarized the parasites recorded from herring from the North Atlantic Ocean and Baltic Sea, noting the occurrence of 35 species, and later (Dollfus 1970) provided a detailed and extensive review of the nematodes recorded from both Atlantic and Pacific herring.

Although the Pacific herring (*C. h. pallasi* Valenciennes) has in recent years received considerable parasitological attention, it is only since Fraser (1920) that reports on its parasite fauna have appeared in the literature. In the northeastern Pacific Ocean, the eastern Bering Sea and the Sea of Japan herring have been included in major parasitological surveys of the fishes of these regions by Soviet parasitologists, among them Layman (1930), Akhmerov (1955), Strelkov (1960), Zhukov (1960a, b, 1963, 1964), and Skrjabina (1963). In the northwestern Pacific Ocean and western Bering Sea, major contributions are those of Bishop and Margolis (1955), Arai (1967a, 1969), and Arthur and Arai (1980a, b), while in the eastern Palaearctic, major reports on the parasites of White Sea herring (*C. h. pallasi* n. *maris-albi* Berg) are those of Shulman and Shulman-Albova (1953), Shulman (1956), and Kulachkova (1971, 1975), among others.

Besides records occurring in restricted taxonomic studies and in parasitological surveys, a considerable volume of literature has been published in recent years dealing with the occurrence and aspects of the biology of larval *Anisakis simplex* (Rudolphi, 1809), a common and widely distributed parasite of herring which has potential significance as a human pathogen. (For reviews on this subject see Kagei 1969; Ruitenberg 1970; and Oshima 1972.) Recent studies have also dealt with aspects of the ecology of herring parasites (see, for example Shulman 1956; Polyansky and Shulman 1956; Kabata 1963; Rokicki 1973; and van Banning and Becker 1978), the zoogeography of the herring and its parasites (Dogiel 1940; Svetovidov and Shulman 1960; Svetovidov 1961), and the use of parasites as "biological tags" to study the discreteness of herring stocks, their movements, and the recruitment of young herring to adult populations (see, for example Sindermann 1957a, 1961a; MacKenzie 1974a, b, 1975a, b, 1978; MacKenzie and Johnston 1976; MacKenzie and Gallacher 1981; Kulachkova 1974b; and Arthur and Arai 1980b).

The records of parasites of *Clupea harengus* presented in this checklist were obtained primarily from the published literature but, in an effort to provide the reader with as much information as possible, records were also obtained from other sources. These included various unpublished research documents (primarily those of the International Council for the Exploration of the Sea and the International Northwest Atlantic Fisheries Commission), certain reports and pamphlets issued by various governmental departments, abstracts of scientific meetings, and university dissertations. Undoubtedly some records contained in documents of this nature have escaped the authors' attention. Additionally some records contained in foreign language papers detailing experimental studies on *Anisakis* larvae isolated from herring may have been overlooked. Reports of a very general nature and those in obvious reference to previous workers have not been included, the reports summarized being restricted to original observations only.

The basis of the system of higher classification used herein follows that given by Margolis and Arthur (1979) with modification of the "Protozoa" as given by Levine et al. (1980). Original records of parasites from herring are summarized in the form of a PARASITE–HOST LIST, a HOST–PARASITE LIST, discussion of species erroneously listed as occurring in herring, and an accompanying bibliography. For each species of parasite contained in the Host–Parasite list the following information is provided:

1) The current *scientific name*, including author(s) and date(s) followed by any recognized synonyms that have been used in establishing records from herring. No attempt has been made to evaluate systematically the validity of published reports; however, attention is drawn to obvious errors, tentative or uncertain identifications, and to cases where identifications have been questioned or material redetermined by subsequent workers.

2) The *location* or site of occurrence of the parasite in its host. In cases where the location reported is considered to be aberrant or where it was unspecified in the original report, the typical site of infection, when possible, was ascertained from records from other host species and is enclosed in square brackets.

3) The *hosts*. Records are listed by host based on the currently accepted division of the herring into two subspecies, the Atlantic herring (*Clupea harengus harengus* L.) and the Pacific herring (*C. h. pallasi* Valenciennes). In cases where only common names were given by original authors, assignment to subspecies, where possible, was based on the common name used or on collection locality. Records for which the subspecies could not be determined with confidence are listed under *Clupea harengus*. The following common names are encountered in the literature: for *C. harengus harengus*—Atlantic herring (American Fisheries Society recognized common name), Baltic herring, high vertebral count herring, herring, haring (Dutch), Hering (German), hareng (French), salaka

(Russian), sild (Norwegian), Strömling (German), and sledź (Polish); and for *C. h. pallasi*—Pacific herring (AFS recognized common name), White Sea herring, Chelsa-Pechora herring, low vertebral count herring, herring, nishin (Japanese), and sel'd (Russian). Numbers in parentheses after each host name correspond with the numbers assigned to the references establishing the particular parasite–host records.

4) The *distribution* (Dist). The geographical distribution of the herring is divided into the following regions: northeastern Atlantic Ocean (NE Atl), northwestern Atlantic Ocean (NW Atl), Baltic Sea, northeastern Pacific Ocean (NE Pac), northwestern Pacific Ocean (NW Pac), eastern Bering Sea (E Ber), western Bering Sea (W Ber), Aral Sea, eastern Palaearctic (E Pal), western Palaearctic (W Pal), eastern Nearctic (E Nea), and western Nearctic (W Nea). Where possible, records from the eastern Palaearctic region are further designated as pertaining to the White, Barents, Norwegian, or Greenland Seas. The North Pacific Ocean and Bering Sea are separated from each other by a line drawn through the Aleutian Islands to Ust Kamchatsk and are divided into eastern and western regions at 170°W longitude. The North Atlantic Ocean is similarly divided into eastern and western regions at 30°W longitude. The area north of the Arctic Circle is divided into four regions, east Palaearctic (0–90°E longitude), western Palaearctic (90–180°E longitude), eastern Nearctic (0–90°W longitude) and western Nearctic (90–180°W longitude). At present no records have been made from the western and eastern Nearctic regions or from the western Palaearctic region.

5) The *record(s)*. The authors responsible for the records of parasites are given in chronological order with each record preceded by a reference number and followed by the geographical locality or localities. This enables the reader to obtain at a glance the author(s) for a particular parasite–host–locality record, as these reference numbers correspond to those given after the appropriate host subspecies. For example: the entries for the digenetic trematode *Lecithaster gibbosus* show that Polyansky (1955) reported this species from *C. harengus harengus* from the Barents Sea. When only one host subspecies is listed for a particular parasite the references are not numbered, and when all records are from the same geographic region it was unnecessary to list the locality after the authors' names. A special problem was encountered with the paper of Dollfus (1956), which summarizes, without citation of references, the parasites recorded from herring from the North Atlantic Ocean and Baltic Sea, including a number of original observations. References to parasites reported to occur in herring from localities that could not be traced to a previous author, but that were not clearly indicated to be original observations are listed as "Dollfus (1956) (original?)" and are accompanied by an explanatory footnote or remark.

6) *Remarks*. Under *Remarks* comments are given on such topics as systematics, possible erroneous reports, the reassignment of misidentified material, and the occurrence of species that are typically parasites of freshwater fishes.

7) *Footnotes*. Under *Footnotes* are included notes on specific items such as tentative identifications, synonyms, and ambiguous collection localities.

A *Host–Parasite list* is provided for each subspecies of *Clupea harengus*. Host synonyms given following each subspecies are only those associated with parasite records. After the name of each species of parasite its geographic distribution for the host in question is given in parentheses. An interrogation mark (?) preceding a parasite name indicates questionable validity of the parasite identification.

Under the heading *Erroneous Records* are discussed a number of species which have been incorrectly listed as occurring in *Clupea harengus*.

PARASITE–HOST CHECKLIST

PHYLUM APICOMPLEXA

Class Sporozoea

order eucoccidiida

Family eimeriidae

Eimeria clupearum (Thélohan, 1894) Doflein, 1909
Syn: *Coccidium clupearum* Thélohan, 1894
Location: liver
Hosts: *Clupea harengus harengus* (1, 2, 3, 4, 5, 6, 7)
C. harengus pallasi (8, 9, 10)
Dist: NE Atl, NW Atl, NE Pac, E Ber Sea
Records: 1. Thélohan 1892 (NE Atl), 2. 1894 (NE Atl); 3. Dollfus 1956 (NE Atl) (original?[1]); 4. Sindermann 1961a (NW Atl), 5. b (NW Atl); 6. Kabata 1963 (NE Atl); 7. Reimer and Jessen 1972 (NE Atl); 8. Arthur 1978 (NE Pac, E Ber Sea); 9. Arthur and Arai 1980a (NE Pac, E Ber Sea), 10. b (NE Pac)

Eimeria nishin Fujita, 1934
Location: testis
Host: *Clupea harengus pallasi*
Dist: NE Pac, NW Pac, E Ber Sea
Records: Fujita 1934 (NW Pac); Arthur 1978 (NE Pac, E Ber Sea); Arthur and Arai 1980a (NE Pac, E Ber Sea), b (NE Pac)
Remarks: Dogiel (1940) considered the validity of *E. nishin* to be doubtful. Arthur and Arai (1980a) note that it is probably a synonym of *E. sardinae* (Thélohan, 1890).

Eimeria sardinae (Thélohan, 1890) Reichenow, 1921
Location: testis
Hosts: *Clupea harengus harengus* (3, 6, 7, 8, 9, 10, 11, 12, 13)
C. harengus pallasi (1, 2, 4, 5)
Dist: NE Atl, NW Atl, Baltic Sea, E Pal (White Sea, Barents Sea)
Records: 1. Dogiel 1940 (White Sea); 2. Shulman and Shulman-Albova 1953 (White Sea); 3. Polyansky 1955 (Barents Sea); 4. Shulman 1956 (White Sea); 5. Polyansky and Shulman 1956 (White Sea); 6. Petrushevsky 1957 (Baltic Sea); 7. Getsevichyute 1958 (Baltic Sea); 8. Sindermann 1961a (NW Atl), 9. b (NW Atl); 10. Kabata 1963 (NE Atl); 11. Gaevskaya 1977 (Baltic Sea), 12. 1979 (Baltic Sea); 13. Gaevskaya and Shapiro 1981 (Baltic Sea)

PHYLUM MICROSPORA

Class Microsporea

order microsporida

Family polysporidae

Pleistophora sp.
Location: cysts in musculature
Host: *Clupea harengus harengus*
Dist: NW Atl
Records: Sindermann 1961b, 1963, 1965

Unidentified Microsporida

Microsporida gen. sp.
Location: cyst in fin
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a

PHYLUM CILIOPHORA

Class Oligohymenophorea

order peritrichida

Family trichodinidae

Trichodina ploveri Zhukov, 1964
Location: gills
Host: *Clupea harengus pallasi*
Dist: W Ber Sea
Record: Zhukov 1964
Remarks: Lom and Laird (1969) regarded this species as a *nomen dubium*.

Trichodinidae gen. sp.
Location: gills
Host: *Clupea harengus harengus*
Dist: NW Atl
Record: Lom and Laird 1969

PHYLUM MYXOZOA

Class Myxosporea

order bivalvulida

Family ceratomyxidae

Ceratomyxa acadiensis Mavor, 1915
Location: gallbladder
Host: *Clupea harengus harengus*
Dist: NW Atl
Records: Ellis 1930;[2] Sindermann 1961b
Remarks: The above records are probably referable to *C. auerbachi* Kabata, 1962.

Ceratomyxa auerbachi Kabata, 1962
Syn: *Ceratomyxa sphaerulosa* of Auerbach, 1909,[3] 1912
Location: gallbladder
Hosts: *Clupea harengus harengus* (1, 2, 3)
C. harengus pallasi (4, 5, 6)
Dist: NE Atl, NE Pac

[1]Dollfus (1956) noted the presence of *E. clupearum* in herring from British waters. We are unaware of any previous report from this locality.

[2]Record of Ellis (1930) is a tentative parasite identification.

[3]Kabata (1962) referred *C. sphaerulosa* of Auerbach, 1909 to *C. auerbachi*.

Records: 1. Auerbach 1909 (NE Atl), 2. 1912 (NE Atl); 3. Kabata 1962 (NE Atl); 4. Arthur 1978 (NE Pac); 5. Arthur and Arai 1980a (NE Pac), 6. b (NE Pac)

Ceratomyxa orientalis (Dogiel, 1948) Shulman, 1953
Location: gallbladder
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea), NW Pac
Records: Shulman and Shulman-Albova 1953 (White Sea, NW Pac); Shulman 1953 (White Sea), 1956 (White Sea); Polyansky and Shulman 1956 (White Sea)
Remarks: The occurrence of this species in *Clupea harengus* requires reassessment. *Ceratomyxa truncata orientalis*, originally described from *Sardinella melanosticta* (syn. of *Sardinops sagax melanosticta*) from the northwestern Pacific Ocean by Dogiel (1948), was first reported (as *C. orientalis*) from *Clupea harengus pallasi* by Shulman (1953) from the White Sea and was additionally recorded from this host from the northwestern Pacific Ocean by Shulman and Shulman-Albova (1953). However, substantial differences in the shape and size of spores reported from these hosts cause us to doubt their conspecificity. Spores from *Sardinella* are arcuate in shape and measure 42–45 μm in width (Dogiel 1948) whereas those from *Clupea* are only slightly curved and measure 33–72 μm in width (49–72 μm for mature spores) (Shulman 1953, 1966; Shulman and Shulman-Albova 1953). Spores of *Ceratomyxa auerbachi* reported by Arthur and Arai (1980a) from northeastern Pacific herring also differ from those of *C. orientalis* from *Sardinella* by possessing slightly curved to straight valves and by greater spore width (72–108 μm). It therefore seems possible that *C. orientalis* does not infect *Clupea harengus* and that a single species, *C. auerbachi*, may occur throughout its distribution.

Leptotheca sp.
Location: kidney tubules
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a

Family SINUOLINEIDAE

Ortholinea orientalis (Shulman and Shulman-Albova, 1953) Shulman, 1965
Syn: *Sphaerospora orientalis* Shulman and Shulman-Albova, 1953
Location: kidney tubules
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea); NE Pac
Records: Shulman and Shulman-Albova 1953 (White Sea); Polyansky and Shulman 1956 (White Sea); Shulman 1956 (White Sea); Arthur 1978 (NE Pac); Arthur and Arai 1980a (NE Pac)

Family SPHAEROSPORIDAE

Chloromyxum sp.
Location: gallbladder
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Shulman and Shulman-Albova 1953; Shulman 1956

ORDER MULTIVALVULIDA

Family TETRACAPSULIDAE

Kudoa clupeidae (Hahn, 1917) Meglitsch, 1947
Syn: *Chloromyxum clupeidae* Hahn, 1917
Kudoa sp. of Laird and Bullock, 1969 (partim)[4]
Includes: Myxosporida of Tyzzer, 1900
Sporozoa of Linton, 1901, 1910
Location: cysts in musculature
Host: *Clupea harengus harengus*
Dist: NE Atl, NW Atl
Records: Tyzzer 1900 (NW Atl); Linton 1901a (NW Atl), 1910 (NW Atl); Hahn 1917 (NW Atl); Sindermann and Rosenfield 1954a (NW Atl); Sindermann and Scattergood 1954 (NW Atl); Sindermann 1957a (NW Atl), b (NW Atl), 1959 (NW Atl), 1961a (NW Atl), b (NW Atl), 1963 (NW Atl), 1965 (NW Atl); Laird and Bullock 1969 (NW Atl); MacKenzie 1983 (NE Atl).
Remarks: As *K. clupeidae* has not been reported from Pacific herring, reports of this species from rockfishes (*Sebastes* spp.) of the northeastern Pacific Ocean (Moser et al. 1976; Heckmann and Jensen 1978) are equivocal.

Unidentified Protozoa

"Sporozoa"
Location: not specified
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Arro 1964

PHYLUM PLATYHELMINTHES

CLASS MONOGENEA

ORDER MONOPISTHOCOTYLEA

Superfamily GYRODACTYLOIDEA

Family GYRODACTYLIDAE

Gyrodactyloides baueri Kulachkova, 1970
Location: nasal cavities
Hosts: *Clupea harengus harengus* (1, 5, 7)
C. harengus pallasi (1, 2, 3, 4, 5, 6, 7)
Dist: E Pal (White Sea), W Ber Sea
Records: 1. Kulachkova 1970 (White Sea), 2. 1971 (White Sea), 3. 1974a (White Sea), 4. b (White Sea), 5. 1975 (White Sea), 6. 1977a (White Sea), 7. b (White Sea, W Ber Sea)

Gyrodactyloides petruschewskii Bykhovsky, 1947
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea), NE Pac, W Ber Sea
Records: Zhukov 1960a (W Ber Sea); Kulachkova 1971 (White Sea), 1974a (White Sea), b (White Sea), 1975 (White Sea), 1977a (White Sea), b (White Sea, W Ber Sea); Arthur 1978 (NE Pac); Arthur and Arai 1980a (NE Pac)

[4]Laird and Bullock (1969) reported *Kudoa* sp. from blood films taken from the heart of several species of northwest Atlantic fishes. They noted that some if not all of their specimens were referable to *K. clupeidae*.

Gyrodactyloides spp.
Location: nasal cavities, [gills]
Hosts: *Clupea harengus harengus*
C. hargenus pallasi
Dist: E Pal (White Sea)
Record: Kulachkova 1968

Gyrodactylus cyclopteri Stsiborskaya, 1948
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Record. Kulachkova 1975

Gyrodactylus flesi Malmberg, 1957
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Kulachkova 1971, 1974b, 1975, 1977a

Gyrodactylus gerdi Bykhovsky, 1948
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Kulachkova 1974b, 1975, 1977a

Gyrodactylus groenlandicus Levinsen, 1881
Includes: *Gyrodactylus groenlandicus groenlandicus* Levinsen, 1881
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Kulachkova 1971, 1974b, 1975, 1977a

Gyrodactylus harengi Malmberg, 1957
Location: gills, fins
Hosts: *Clupea harengus harengus* (1, 5)
C. harengus pallasi (2, 3, 4, 5, 6, 7, 8, 9)
Dist: E Pal (White Sea), Baltic Sea, W Ber Sea, NE Pac
Records: 1. Malmberg 1957 (Baltic Sea); 2. Zhukov 1960a (W Ber Sea); 3. Kulachkova 1971 (White Sea), 4. 1974b (White Sea), 5. 1975 (White Sea), 6. 1977a (White Sea), 7. b (W Ber Sea); 8. Arthur 1978 (NE Pac); 9. Arthur and Arai 1980a (NE Pac)
Remarks: Malmberg (1957) also noted *G. harengi* or a closely related species on *C. h. harengus* from the northwestern Atlantic Ocean.

Gyrodactylus pterygialis Bykhovsky and Polyansky, 1953
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Kulachkova 1974b, 1975, 1977a

Gyrodactylus pungitii Malmberg, 1964
Location: gills
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea)
Records: Kulachkova 1974b, 1975, 1977a

Gyrodactylus robustus Malmberg, 1957
Location: [fins]
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea), W Ber Sea
Records: Kulachkova 1971 (White Sea), 1974b (White Sea), 1975 (White Sea), 1977a (White Sea), b (W Ber Sea)

Gyrodactylus spp.
Location: gills
Hosts: *Clupea harengus harengus* (1)
C. harengus pallasi (2, 4, 5, 6, 7)
C. harengus (2)
Dist: NW Atl, E Pal (White Sea)
Records: 1. Sindermann 1957a (NW Atl); 2. Kulachkova 1968 (White Sea), 3. 1971 (White Sea), 4. 1974a (White Sea), 5. b (White Sea), 6. 1975 (White Sea), 7. 1977a (White Sea)

Laminiscus dogieli (Zhukov, 1960) Pálsson and Beverley-Burton, 1983.
Syn: *Gyrodactyloides dogieli* Zhukov, 1960
Location: gills
Hosts: *Clupea harengus harengus* (5, 7)
C. harengus pallasi (1, 2, 3, 4, 5, 6, 7)
Dist: E Pal (White Sea), W Ber Sea
Records: 1. Zhukov 1960a (W Ber Sea); 2. Kulachkova 1971 (White Sea), 3. 1974a (White Sea), 4. b (White Sea), 5. 1975 (White Sea), 6. 1977a (White Sea), 7. b (White Sea, W Ber Sea)

Unidentified Gyrodactyloidea

Gyrodactyloidea gen. spp.
Location: gills, body surface
Host: *Clupea harengus pallasi*
Dist: E Pal (White Sea), NE Pac
Records: Arai 1967a (NE Pac), 1969 (NE Pac); Kulachkova 1977b (White Sea)

ORDER POLYOPISTHOCOTYLEA

Superfamily DICLIDOPHOROIDEA

Family MAZOCRAEIDAE

Mazocraeoides georgei Price, 1936
Location: gills
Host: *Clupea harengus harengus*
Dist: NW Atl
Record: Price 1961

Mazocraes harengi (van Beneden and Hesse, 1863) Baylis and Jones, 1933
Syn: *Octobothrium harengi* (van Beneden and Hesse, 1863)
Octocotyle harengi van Beneden and Hesse, 1863
Location: gills
Host: *Clupea harengus harengus*
Dist: NE Atl
Records: van Beneden and Hesse 1864; Scott 1901

CLASS TREMATODA

SUBCLASS DIGENEA

ORDER STRIGEIDA

Superfamily STRIGEOIDEA

Family DIPLOSTOMATIDAE

Diplostomum spathaceum (Rudolphi, 1819) Olsson, 1876 (metacercaria)
Syn: *Diplostomulum spathaceum* (Rudolphi, 1819)
Location: lens of eye
Hosts: *Clupea harengus harengus* (3, 4, 5, 6, 7)
C. harengus pallasi (1, 2)
Dist: E Pal (White Sea), Baltic Sea
Records: 1. Shulman and Shulman-Albova 1953 (White Sea); 2. Shulman 1956 (White Sea); 3. Petrushevsky 1957

(Baltic Sea); 4. Getsevichyute 1958 (Baltic Sea); 5. Reimer 1962 (Baltic Sea), 6. 1970 (Baltic Sea); 7. Gaevskaya 1979 (Baltic Sea) (original ?)

Remarks: *Diplostomum spathaceum* is typically a parasite of freshwater fishes.

Superfamily HEMIUROIDEA

Family DEROGENIDAE

Derogenes varicus (O. F. Müller, 1784) Looss, 1901

Location: stomach, intestine

Hosts: *Clupea harengus harengus* (1, 2, 3, 5, 8, 11)
C. harengus pallasi (4, 6, 7, 9, 10)

Dist: NE Atl, NW Atl, E Pal (Barents Sea, White Sea), NW Pac

Records: 1. Stafford 1904 (NW Atl), 2. 1907 (NW Atl); 3. Cooper 1915 (NW Atl);[5] 4. Shulman and Shulman-Albova 1953 (White Sea); 5. Polyansky 1955 (Barents Sea); 6. Polyansky and Shulman 1956 (White Sea); 7. Shulman 1956 (White Sea); 8. Dollfus 1956 (NE Atl) (original?);[6] 9. Zhukov 1960b (NW Pac); 10. Skrjabina 1963 (NW Pac); 11. Reimer and Jessen 1972 (NE Atl)

Family HEMIURIDAE

Brachyphallus crenatus (Rudolphi, 1802) Odhner, 1905

Syn: *Brachyphallus amuriensis* Babaskin, 1928
Hemiurus luehei of Markowski, 1933[7]

Location: stomach, intestine

Hosts: *Clupea harengus harengus* (1, 2, 3, 5, 6, 7, 10, 13, 14, 19, 22, 23, 24, 25, 26, 30)
C. harengus pallasi (4, 8, 9, 11, 12, 15, 16, 17, 18, 20, 21, 27, 28, 29)

Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Barents Sea, White Sea), E Ber Sea, W Ber Sea, NE Pac, NW Pac

Records: 1. Cooper 1915 (NW Atl);[8] 2. Manter 1925 (NW Atl), 3. 1926 (NW Atl); 4. Layman 1930 (NW Pac); 5. Markowski 1933 (Baltic Sea); 6. Linton 1940 (NW Atl); 7. Heller 1949 (NW Atl); 8. Shulman-Albova 1952 (White Sea); 9. Shulman and Shulman-Albova 1953 (White Sea); 10. Polyansky 1955 (Barents Sea); 11. Shulman 1956 (White Sea); 12. Polyansky and Shulman 1956 (White Sea); 13. Sindermann 1957a (NW Atl), 14. 1961a (NW Atl); 15. Strelkov 1960 (NW Pac); 16. Zhukov 1960b (NW Pac), 17. 1963 (W Ber Sea); 18. Skrjabina 1963 (NW Pac); 19. Reimer 1970 (Baltic Sea); 20. Ivanchenko and Grozdilova 1971 (experimental — White Sea), 21. 1981 (experimental — White Sea); 22. Reimer and Jessen 1972 (NE Atl); 23. Rokicki 1973 (Baltic Sea), 24. 1975 (Baltic Sea); 25. Gaevskaya 1977 (Baltic Sea), 26. 1979 (Baltic Sea); 27. Arthur 1978 (NE Pac, E Ber Sea); 28. Arthur and Arai 1980a (NE Pac, E Ber Sea), 29. b (NE Pac); 30. Gaevskaya and Shapiro 1981 (Baltic Sea)

Hemiurus appendiculatus (Rudolphi, 1802) Looss, 1899

Syn: *Distoma appendiculatum* (Rudolphi, 1802)

Location: stomach, intestine

Hosts: *Clupea harengus harengus* (2, 3, 4, 5)
C. harengus (1)

Dist: NE Atl, NW Atl, Baltic Sea

Records: 1. Creplin 1839 (unspecified locality);[9] 2. van Beneden 1871 (NE Atl); 3. Linton 1901a (NW Atl),[10] 4. 1940 (NW Atl); 5. Petrushevsky 1957 (Baltic Sea)

Remarks: The report of *H. appendiculatus* from *C. h. harengus* by Stafford (1907) is referred to *H. levinseni* Odhner, 1905 following Miller (1941). Odhner (1905) referred the material reported as *Distoma appendiculatum* from *C. h. harengus* by Olsson (1867–68) to *Hemiurus luehei* Odhner, 1905.

Dr D. I. Gibson (British Museum (Natural History), London, England, personal communication) regards all records of *H. appendiculatus* from *C. harengus* to be probable misidentifications of *H. luehei*.

Hemiurus levinseni Odhner, 1905

Syn:? *Hemiurus appendiculatus* of Stafford, 1907 (partim)[11]

Location: stomach, pyloric caeca

Hosts: *Clupea harengus harengus* (1, 2, 3)
C. harengus pallasi (4, 5, 6)

Dist: NW Atl, E Pal (Barents Sea), NE Pac, NW Pac

Records: 1. Cooper 1915 (NW Atl);[12] 2. Miller 1941 (NW Atl); 3. Polyansky 1955 (Barents Sea); 4. Skrjabina 1963 (NW Pac); 5. Arthur 1978 (NE Pac); 6. Arthur and Arai 1980a (NE Pac)

Hemiurus luehei Odhner, 1905

Syn: *Fasciola ocreata* Rudolphi, 1802
Distoma ocreata (Rudolphi, 1802)
Hemiurus ocreatus (Rudolphi, 1802)
?*Hemiurus halecis* (Gmelin, 1790)
Distoma appendiculatum of Olsson, 1867–68 (partim)[13]

Includes: ?"vermiculi" of van Leeuwenhoek, 1697

Location: stomach, pyloric caeca, intestine

Hosts: *Clupea harengus harengus* (4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21)
C. harengus (1, 2, 3, 5, 7)

Dist: NE Atl, Baltic Sea

Records: 1. van Leeuwenhoek 1697 (unspecified locality); 2. Rudolphi 1802 (unspecified locality), 3. 1809 (unspecified locality), 4. 1819 (Baltic Sea); 5. Krøyer 1846–49 (unspecified locality) (original?); 6. Olsson 1867–68 (NE Atl); 7. Odhner 1905 (unspecified locality); 8. Nicoll 1907 (NE Atl), 9. 1910 (NE Atl), 10. 1915 (NE Atl); 11. Markowski 1938 (NE Atl);[14] 12. Hansen 1955 (NE Atl); 13. Dollfus 1956 (NE Atl) (original?);[15]

[5]Cooper (1915) reported mature (egg bearing) *D. varicus* encysted on the viscera and in the musculature of *C. h. harengus*.

[6]Dollfus (1956) noted that *D. varicus* has been found very commonly in herring from the Plymouth region. We were unable to locate any previous records of *D. varicus* from herring from this locality.

[7]Rokicki (1973) referred *H. luehei* of Markowski, 1933 to *Brachyphallus*. Reimer (1970) corrected this determination to *B. crenatus*.

[8]Record of Cooper (1915) includes one specimen encysted in the musculature.

[9]Specimens reported as *Distoma appendiculatum* by Creplin (1839) were probably of Baltic origin.

[10]The report of Linton (1901a) was a tentative parasite identification.

[11]Miller (1941) identified material from the collection of Stafford as *H. levinseni*. He considered these specimens probably to have been reported as *H. appendiculatus* by Stafford (1907).

[12]The record of Cooper (1915) was for metacercariae of *H. levinseni* encysted in the musculature of *C. h. harengus*.

[13]Odhner (1905) referred *Distoma appendiculatum* of Olsson (1866-67) from *Clupea harengus* to *H. luehei*.

[14]The record of Markowski (1938) was given as "*Hemiurus ocreatus* (Molin 1863)."

[15]Dollfus (1956) noted that *H. luehei* (as *H. halecis*) occurred in herring off Belgium and northern France. We are unaware of any previous records of *H. leuhei* from *C. harengus* from these localities.

14. Willemse 1968 (NE Atl); 15. Reimer 1970 (Baltic Sea); 16. Reimer and Jessen 1972 (NE Atl); 17. Rokicki 1973 (Baltic Sea), 18. 1975 (Baltic Sea); 19. Gaevskaya 1977 (Baltic Sea), 20. 1979 (Baltic Sea); 21. Gaevskaya and Shapiro 1981 (Baltic Sea).

Remarks: *Hemiurus luehei* has an involved taxonomic history. Van Leeuwenhoek (1697) first recorded as "vermiculi" hemiurid trematodes from the stomach of herring purchased in Amsterdam. The name *Fasciola halecis* was subsequently used by Gmelin (1791) for van Leeuwenhoek's specimens. *Fasciola halecis* appears to later have been renamed *F. ocreata* by Rudolphi (1802). Unfortunately this name is a junior primary homonym of *F. ocreata* Goeze, 1782, now the type-species of *Ityogonimus*. Odhner (1911) reexamined Rudolphi's specimens of *F. ocreata*, identifying them as *H. luehei*. Dollfus (1956) resurrected *Fasciola halecis* as *Hemiurus halecis* (Gmelin, 1790). However this name is considered a questionable synonym of *H. luehei*, as the material described by van Leeuwenhoek is in fact unrecognizable. *Hemiurus luehei* of Markowski (1933) is referred to *Brachyphallus crenatus* following Reimer (1970).

Hemiurus raabei Slusarski, 1958
Location: stomach
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Rokicki 1973, 1975; Gaevskaya 1977
Remarks: The validity of *H. raabei* requires confirmation. Perhaps it is a synonym of *H. luehei*.

Parahemiurus merus (Linton, 1910) Woolcock, 1935
Location: stomach, intestine
Hosts: *Clupea harengus harengus* (5, 6)
C. harengus pallasi (1, 2, 3, 4, 7, 8)
Dist: Baltic Sea, NE Pac
Records: 1. Nahhas 1960 (NE Pac); 2. Arai 1967a (NE Pac), 3. 1969 (NE Pac); 4. Chapa 1969 (NE Pac); 5. Rokicki 1973 (Baltic Sea); 6. Gaevskaya 1977 (Baltic Sea); 7. Arthur 1978 (NE Pac); 8. Arthur and Arai 1980a (NE Pac)
Remarks: The occurrence of *P. merus* in the Baltic Sea requires substantiation. D. I. Gibson (personal communication) considers it possible that the records of Rokicki (1973) and Gaevskaya (1977) may be based on anomalous *H. luehei*.

Family LECITHASTERIDAE

Lecithaster confusus Odhner, 1905
Syn: *Distomum botryophoron* of Linton, 1901[16]
Location: intestine
Hosts: *Clupea harengus harengus* (1, 2, 3, 5, 8, 9)
C. harengus pallasi (4, 6, 7)
Dist: Baltic Sea, NW Atl, E Pal (White Sea, Barents Sea)
Records: 1. Linton 1901a (NW Atl); 2. 1940 (NW Atl); 3. Odhner 1905 (unspecified locality);[17] 4. Shulman and Shulman-Albova 1953 (White Sea); 5. Polyansky 1955 (Barents Sea); 6. Shulman 1956 (White Sea); 7. Polyansky and Shulman 1956 (White Sea); 8. Reimer 1970 (Baltic Sea); 9. Odening 1978 (Baltic Sea)

Lecithaster gibbosus (Rudolphi, 1802) Lühe, 1901
Syn: *Lecithaster salmonis* Yamaguti, 1934
Lecithaster bothryophorus of Stafford, 1904, 1907
Location: stomach, intestine
Hosts: *Clupea harengus harengus* (1, 2, 3, 4, 5, 16)
C. harengus pallasi (6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20)
Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Barents Sea, White Sea), NE Pac, E Ber Sea, W Ber Sea
Records: 1. Stafford 1904 (NW Atl), 2. 1907 (NW Atl); 3. Odhner 1905 (unspecified locality);[18] 4. Polyansky 1955 (Barents Sea); 5. Dollfus 1956 (NE Atl);[19] 6. Nahhas 1960 (NE Pac); 7. Zhukov 1963 (W Ber Sea); 8. Arai 1967a (NE Pac), 9. b (NE Pac), 10. 1969 (NE Pac); 11. Barraclough 1967 (NE Pac); 12. Barraclough and Fulton 1967 (NE Pac); 13. Robinson et al. 1968a (NE Pac), 14. b (NE Pac); 15. Chapa 1969 (NE Pac); 16. Rokicki 1973 (Baltic Sea); 17. Arthur 1978 (NE Pac, E Ber Sea); 18. Arthur and Arai 1980a (NE Pac, E Ber Sea), 19. b (NE Pac); 20. Ivanchenko and Grozdilova 1981 (experimental — White Sea)

Lecithaster sp.
Location: digestive tract
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Layman 1930

Superfamily FELLODISTOMATOIDEA

Family FELLODISTOMATIDAE

Pronoprymna petrowi (Layman, 1930) Bray and Gibson, 1980
Syn: *Bacciger petrowi* (Layman, 1930)
Pentagramma petrowi (Layman, 1930)
Pseudopentagramma petrowi (Layman, 1930)
Location: plyoric caeca, intestine
Host: *Clupea harengus pallasi*
Dist: NE Pac, E Ber Sea, W Ber Sea
Records: Zhukov 1963 (W Ber Sea); Margolis and Ching 1965 (NE Pac); Barraclough and Fulton 1967 (NE Pac); Arai 1967a (NE Pac), 1969 (NE Pac); Arthur 1978 (NE Pac, E Ber Sea); Arthur and Arai 1980a (NE Pac, E Ber Sea), b (NE Pac)

Superfamily BUCEPHALOIDEA

Family BUCEPHALIDAE

Prosorhynchoides basargini (Layman, 1930) Margolis and Arthur, 1979 (metacercaria)
Includes: Bucephalidae gen. sp. of Arthur and Arai, 1979 (partim)
Location: encysted in fins, nasal cavities, mouth
Dist: NE Pac, E Ber Sea
Records: Arthur 1978 (NE Pac, E Ber Sea); Arthur and Arai 1979 (NE Pac), 1980a (NE Pac, E Ber Sea), b (NE Pac)

[16]Linton (1940) referred his tentative identification of *Distomum botryophoron* (as "Distomum bothyryophoron Olsson (?)") from *C. h. harengus* (Linton 1901a) to *L. confusus*.

[17]Odhner (1905) reported *L. confusus* as occurring in *Clupea harengus* in northern seas.

[18]Odhner (1905) reported *L. gibbosus* from a number of Scandinavian fishes but did not give precise localities.

[19]Dollfus (1956) noted that this species had been reported from Scottish herring. We have not encountered any previous report from this locality.

Prosorhynchoides gracilescens (Rudolphi, 1819) Stunkard, 1976 (metacercaria)
Syn: *Bucephalopsis gracilescens* (Rudolphi, 1819)
Location: encysted in mesenteries of heart
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Zhukov 1960b

Rhipidocotyle sp. metacercaria
Syn: *Rhipidocotyle elongata* of Arthur, 1978
Includes: Bucephalidae gen. sp. of Arthur and Arai, 1979 (partim)
Location: encysted in fins, nasal cavities, mouth
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1979, 1980a, b

ORDER ECHINOSTOMATIDA

Superfamily ECHINOSTOMATOIDEA

Family ECHINOSTOMATIDAE

Stephanoprora pseudoechinata (Olsson, 1876) Yamaguti, 1958 (metacercaria)
Syn: *Mesorchis pseudoechinatus* (Olsson, 1876)
Location: not specified
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Reimer 1970

ORDER RENICOLIDA

Superfamily RENICOLOIDEA

Family RENICOLIDAE

Renicola spp. metacercaria
Location: encysted on pyloric caeca
Host: *Clupea harengus harengus*
Dist: NE Atl
Records: MacKenzie 1974a, b, 1975a, b, c, 1976, 1978, 1983; MacKenzie and Johnston 1976; MacKenzie and Gallacher 1981

ORDER PLAGIORCHIIDA

Superfamily ALLOCREADIOIDEA

Family LEPOCREADIIDAE

Neophasis oculata (Levinsen, 1881) Miller, 1941
Syn: *Distoma oculatum* Levinsen, 1881
Location: [pyloric caeca, intestine]
Host: *Clupea harengus*
Dist: not specified
Record: von Linstow 1889 (original?)
Remarks: von Linstow (1889) listed this species (as "*Distomum oculatum* Rud.") from *Clupea harengus*. No collection locality or reference for this record was given.

Opechona bacillaris (Molin, 1859) Looss, 1907
Location: digestive tract
Host: *Clupea harengus harengus*
Dist: NE Atl
Record: Dollfus 1956 (original?)
Remarks: Ward and Fillingham (1934) attributed to Nicoll (publication not specified) a report of this species from *Clupea harengus* from Plymouth, England. We have not been able to verify this report. Dollfus (1956) also noted that *O. bacillaris* was a frequently observed parasite of herring from Plymouth.

Family OPECOELIDAE

Opecoeloides vitellosus (Linton, 1900) von Wicklen, 1946
Syn: *Cymbephallus vitellosus* (Linton, 1900)
Distomum vitellosum Linton, 1900
Location: [intestine]
Host: *Clupea harengus harengus*
Dist: NW Atl
Records: Linton 1901a, 1940
Remarks: Dollfus (1956) considered *Distomum vitellosum* to be a "collective" name and noted that the identity of the material reported from *C. h. harengus* cannot be determined.

Podocotyle atomon (Rudolphi, 1802) Odhner, 1905
Location: digestive tract
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Layman 1930

Podocotyle reflexa (Creplin, 1825) Odhner, 1905
Location: digestive tract
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Skrjabina 1963

ORDER OPISTHORCHIIDA

Superfamily OPISTHORCHIOIDEA

Family HETEROPHYIDAE

Cryptocotyle lingua (Creplin, 1825) Fischoeder, 1903 (metacercaria)
Location: encysted in skin
Host: *Clupea harengus harengus*
Dist: NW Atl
Records: Sindermann and Rosenfield 1954a, b; Sindermann and Scattergood 1954; Sindermann 1957a, 1963, 1965, 1966; Sindermann and Farrin 1962

Galactosomum phalacrocoracis Yamaguti, 1939 (metacercaria)
Location: encysted on pharynx
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a, b

Unidentified Digenea

Digenea gen. sp. metacercaria
Includes: Trematoda auct.
Location: encysted on skin, body wall
Hosts: *Clupea harengus harengus* (1)
C. harengus pallasi (2, 3)
Dist: Aral Sea, E Ber Sea
Records: 1. Osmanov 1971 (Aral Sea); 2. Arthur 1978 (E Ber Sea); 3. Arthur and Arai 1980a (E Ber Sea)

Digenea gen. spp.
Includes: Trematoda auct.
Location: stomach, intestine
Hosts: *Clupea harengus harengus* (1, 3, 4)
C. harengus pallasi (2, 5, 6)
Dist: NE Atl, Baltic Sea, NE Pac, NW Pac

Records: 1. Levander 1909 (Baltic Sea); 2. Layman 1930 (NW Pac); 3. Marshall et al. 1937 (NE Atl); 4. Popiel 1951 (Baltic Sea); 5. Barraclough 1967 (NE Pac); 6. Barraclough and Fulton (1967) (NE Pac)
Remarks: Hemiurid trematodes reported as "vermiculi" from the stomach of herring from Amsterdam by van Leeuwenhoek (1697) are listed under *Hemiurus luehei*.

Class Cestoidea

Subclass Cestoda

order trypanorhyncha

Family lacistorhynchidae

Grillotia erinaceus (van Beneden, 1858) Guiart, 1927 (plerocercoid)
Syn: *Rhynchobothrium imparispine* Linton, 1890
Location: encysted in wall of stomach
Host: *Clupea harengus harengus*
Dist: NW Atl
Records: Linton 1901a, 1924

Lacistorhynchus tenuis (van Beneden, 1858) Dollfus, 1929 (plerocercoid)
Syn: *Rhynchobothrium bulbifer* Linton, 1890
Lacistorhynchus sp. auct.
Location: encysted on viscera, in musculature, and free in intestine
Host: *Clupea harengus harengus*
Dist: NE Atl, NW Atl
Records: Linton 1924 (NW Atl); MacKenzie 1974a (NE Atl), b (NE Atl), 1975a (NE Atl), c (-), 1976 (NE Atl), 1978 (NE Atl), 1983 (NE Atl); MacKenzie and Johnston 1976 (NE Atl); MacKenzie and Gallacher 1981 (NE Atl)

Family tentaculariidae

Nybelinia surmenicola Okada in Dollfus, 1929 (plerocercoid)
Location: encysted in liver
Host: *Clupea harengus pallasi*
Dist: E Ber Sea
Records: Arthur 1978; Arthur and Arai 1980a

Unidentified Trypanorhyncha

Trypanorhyncha gen. spp. plerocercoid
Includes: *Rhynchobothrium* sp. of Linton, 1901
"Tetrarhynch cestode" of Davey, 1972
Location: encysted on viscera, in liver, mesenteries, and musculature
Hosts: *Clupea harengus harengus* (1, 2, 3, 4, 5, 6, 7, 8)
C. harengus pallasi (9, 10, 11)
Dist: NE Atl, NW Atl, NE Pac
Records: 1. Linton 1901a (NW Atl), 2. b (NW Atl); 3. Sindermann 1957a (NW Atl), 4. 1959 (NW Atl), 5. 1961a (NW Atl), 6. 1963 (NW Atl), 7. 1965 (NW Atl); 8. Davey 1972a (NE Atl); 9. Arthur 1978 (NE Pac); 10. Arthur and Arai 1980a (NE Pac), 11. b (NE Pac)

order pseudophyllidea

Family amphicotylidae

Abothrium gadi van Beneden, 1870 (plerocercoid)
Location: not specified
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Reimer 1970

Eubothrium crassum (Bloch, 1779) Nybelin, 1922
Syn: *Bothriotaenia proboscidea* (Batsch, 1786)
Location: intestine, pyloric caeca
Hosts: *Clupea harengus harengus* (1, 2, 3)
C. harengus pallasi (4, 5)
Dist: E Pal (White Sea), Baltic Sea, W Ber Sea
Records: 1. Schneider 1902a (Baltic Sea), 2. b (Baltic Sea); 3. Levander 1909 (Baltic Sea); 4. Shulman and Shulman-Albova 1953 (White Sea); 5. Zhukov 1963 (W Ber Sea)
Remarks: Only immature *E. crassum* have been reported from *Clupea harengus*. *Eubothrium crassum* is typically a parasite of salmonid fishes. Records of *Bothriotaenia proboscidea* from *C. harengus* were listed as *Bothriocephalus* sp. by Jääskelainen (1921).

Eubothrium spp.
Location: intestine, wall of intestine
Hosts: *Clupea harengus harengus* (3, 4, 5, 6)
C. harengus pallasi (1, 2)
Dist: E Pal (White Sea), Baltic Sea
Records: 1. Shulman 1956 (White Sea); 2. Polyansky and Shulman 1956 (White Sea); 3. Petrushevsky 1957 (Baltic Sea); 4. Gaevskaya 1977 (Baltic Sea), 5. 1979 (Baltic Sea); 6. Gaevskaya and Shapiro 1981 (Baltic Sea)

Family bothriocephalidae

Bothriocephalus scorpii (O.F. Müller, 1776) Rudolphi, 1808
Location: pyloric caeca, intestine
Hosts: *Clupea harengus harengus* (1, 3, 4, 5)
C. harengus pallasi (2)
Dist: NW Atl, Baltic Sea, W Ber Sea
Records: 1. Linton 1941 (NW Atl); 2. Zhukov 1963 (W Ber Sea); 3. Reimer 1970 (Baltic Sea); 4. Rokicki 1973 (Baltic Sea), 5. 1975 (Baltic Sea)

Bothriocephalus sp.
Location: not specified
Host: *Clupea harengus harengus*
Dist: Baltic Sea, NW Atl
Records: Linton 1941 (NW Atl);[20] Gaevskaya 1977 (Baltic Sea)

Family ligulidae

Ligula intestinalis (Linnaeus, 1758) Gmelin, 1790 (plerocercoid)
Syn: ?*Ligula digramma* Creplin, 1839
Location: body cavity
Host: *Clupea harengus*
Dist: not specified
Record: von Linstow 1889 (original ?)
Remarks: The authenticity of this report is suspect. *Ligula intestinalis* is typically a parasite of freshwater fishes. Dubinina (1966) lists *L. digramma* Creplin, 1839 as a synonym of *Digramma interrupta* (Rudolphi, 1810).

Unidentified Pseudophyllidea

Pseudophyllidea gen. spp.
Location: intestine, intestinal wall
Hosts: *Clupea harengus harengus* (4, 5)
C. harengus pallasi (1, 2, 3)
Dist: NW Atl, E Pal (White Sea), NW Pac
Records: 1. Shulman and Shulman-Albova 1953 (White Sea); 2. Shulman 1956 (White Sea); 3. Skrjabina 1963 (NW Pac); 4. Sindermann 1963 (NW Atl), 5. 1965 (NW Atl)

[20]Record of Linton (1941) was for an encysted plerocercoid.

ORDER TETRAPHYLLIDEA

Tetraphyllidea of Uncertain Position

Scolex pleuronectis O. F. Müller, 1788 (plerocercoid)
Syn: *Scolex polymorphus* Rudolphi, 1819
Phyllobothrium sp. auct.
Location: gallbladder, pyloric caeca, intestine
Hosts: *Clupea harengus harengus* (2, 3, 4, 7, 12, 13, 16)
C. harengus pallasi (5, 6, 8, 9, 10, 11, 14, 15, 17, 18, 19)
C. harengus (1)
Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Barents Sea, White Sea), NE Pac, NW Pac, W Ber Sea
Records: 1. Olsson 1866–67 (unspecified locality);[21] 2. Linton 1901a (NW Atl), 3. 1924 (NW Atl); 4. Giard 1903 (NE Atl); 5. Layman 1930 (NW Pac); 6. Shulman and Shulman-Albova 1953 (White Sea); 7. Polyansky 1955 (Barents Sea); 8. Polyansky and Shulman 1956 (White Sea); 9. Shulman 1956 (White Sea); 10. Zhukov 1960b (NW Pac), 11. 1963 (W Ber Sea); 12. Rosenthal 1966 (experimental — NE Atl),[22] 13. 1967 (experimental — NE Atl); 14. Arai 1967a (NE Pac), 15. 1969 (NE Pac); 16. Reimer 1970 (Baltic Sea); 17. Ivanchenko and Grozdilova 1971 (experimental — White Sea); 18. Arthur 1978 (NE Pac); 19. Arthur and Arai 1980a (NE Pac)
Remarks: *Scolex pleuronectis* is a larval name under which plerocercoids of various tetraphyllidean species have been assigned.

ORDER PROTEOCEPHALIDEA

Family PROTEOCEPHALIDAE

Proteocephalus spp.
Location: intestine
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Getsevichyute 1958; Lisivnenko 1961; Gaevskaya 1977, 1979; Gaevskaya and Zhudova 1979
Remarks: *Proteocephalus* spp. are typically parasites of freshwater fishes.

Unidentified Cestoda

Cestoda gen. spp.
Includes: "Cestoscolex" of van Beneden, 1871
Scolex bothriosimplex Reimer, 1970
Location: intestine
Host: *Clupea harengus harengus*
Dist: NE Atl, Baltic Sea
Records: van Beneden 1871 (NE Atl); Marshall et al. 1937 (NE Atl); Hentschel 1950 (NE Atl); Popiel 1951 (Baltic Sea); Dollfus 1956 (NE Atl);[23] Anon. 1969 (NE Atl); Reimer 1970 (Baltic Sea)

[21]Material reported by Olsson (1866–67) was from herring obtained at a fishmarket in Warburg [Varberg, Sweden] and was thus probably of Baltic origin.

[22]The record of Rosenthal (1966) was a tentative parasite identification.

[23]Dollfus (1956) noted that larval cestodes have been reported from herring from Plymouth, England. We have been unable to locate any previous report from this locality.

PHYLUM NEMATHELMINTHES[24]

CLASS NEMATODA

SUBCLASS SECERNENTEA

ORDER ASCARIDIDA

Superfamily ASCARIDOIDEA

Family ANISAKIDAE

Anisakis simplex (Rudolphi, 1809) Dujardin, 1845 (larva)
Syn: *Anisakis marina* auct.
Acanthocheilus rotundatus auct.
Anacanthocheilus rotundatus auct.
Eustoma rotundata auct.
Pseudanisakis rotundata auct.
Includes: "haringnematoden" of Houwing, 1969
Location: body cavity, viscera, mesenteries, musculature
Hosts: *Clupea harengus harengus* (1, 2, 3, 7, 8, 9, 10, 11, 12, 14, 15, 16, 19, 20, 21, 22, 23, 24, 27, 28, 30, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41)
C. harengus pallasi (6, 20, 34, 42, 43, 44, 45)
C. harengus (4, 5, 13, 17, 18, 25, 26, 29, 32)
Dist: NE Atl, NW Atl, Baltic Sea, NE Pac, NW Pac, E Ber Sea
Records: 1. Wülker 1930 (NE Atl);[25] 2. Kahl 1938 (NE Atl),[25] 3. 1939 (NE Atl); 4. Löliger-Müller 1955 (unspecified locality);[26] 5. Chalupský 1955 (unspecified locality);[27] 6. Akhmerov 1955 (NW Pac); 7. Kreis 1958 (NE Atl); 8. van Thiel et al. 1960 (NE Atl); 9. Kuipers et al. 1960 (NE Atl); 10. Kuipers et al. 1960 (NE Atl); 11. Roskam 1960 (NE Atl), 12. 1967 (NE Atl); 13. Kuipers et al. 1963 (unspecified locality);[28] 14. van Thiel 1967 (NE Atl); 15. Polak 1967 (unspecified locality);[28] 16. Mameren and Houwing 1968 (NE Atl); 17. Houwing 1969a (unspecified locality);[28] 18. b (unspecified locality);[28] 19. Anon. 1970 (NE Atl); 20. Stankiewicz 1971 (NW Atl, unspecified locality);[29] 21. Ruitenberg 1970 (unspecified locality),[30] 22. 1971 (unspecified locality);[30] 23. Ruitenberg et al. 1970 (unspecified locality),[30] 24. 1971 (unspecified locality);[30] 25. Priebe 1971 (unspecified locality); 26. van Banning 1971 (unspecified locality),[28] 27. 1972 (NE Atl); 28. Grabda 1973a (NE Atl, Baltic Sea), 29. b (unspecified locality), 30. 1974a (Baltic Sea), 31. b (Baltic

[24]Dollfus (1970) gave a detailed historical review of the nematodes reported from *Clupea harengus*.

[25]The records of Wülker (1930) and Kahl (1938) of *Anacanthocheilus rotundatus* from *Clupea harengus* were referred to *Anisakis* by Dollfus (1970).

[26]Nematodes reported as *Acanthocheilus rotundatus* by Löliger-Müller (1955) were from herring of unspecified origin examined in Leipzig, East Germany.

[27]Nematodes reported as *Pseudanisakis rotundata* larva by Chalupský (1955) were from herring originating from Norway.

[28]Nematodes reported as *Eustoma rotundatum* by Kuipers et al. (1963), as *Anisakis marina* by Polak (1967), Houwing (1969a) and van Banning (1971) and as "haringnematoden" by Houwing (1969b) probably originated from the northeastern Atlantic Ocean.

[29]Pacific herring examined by Stankiewicz (1971) were noted to have originated from the USSR.

[30]Records of Ruitenberg (1970, 1971) and Ruitenberg et al. (1970, 1971) were for herring obtained from the Institute for Fishery Products, IJmuiden, the Netherlands, and thus probably originated from the northeastern Atlantic Ocean.

Sea), 32. (unspecified locality), 33. 1975 (Baltic Sea), 34. 1976 (Baltic Sea, NE Atl, unspecified locality); 35. Grabda and Felinska 1975 (Baltic Sea); 36. Pippy and van Banning 1975 (NE Atl); 37. Pippy 1975 (NE Atl, NW Atl); 38. Beverley-Burton et al. 1977 (NE Atl, NW Atl); 39. Gaevskaya and Umnova 1977 (NW Atl); 40. Friess 1977 (Baltic Sea); 41. Beverley-Burton and Pippy 1977 (NE Atl, NW Atl); 42. Arthur 1978 (NE Pac, E Ber Sea); 43. Arthur and Arai 1979 (NE Pac), 44. 1980a (NE Pac, E Ber Sea), 45. b (NE Pac)

Remarks: Although reports of larval nematodes encysted on the viscera and in the body cavity of herring date from the 17th century (van Leeuwenhoek 1697), it is only recently that the true identity of the species most likely to be noted in herring, *Anisakis simplex*, has been resolved (Dollfus 1970; Pippy and van Banning 1975; Beverley-Burton et al. 1977). The brief and, by current standards, inadequate nature of descriptions of larval nematodes occurring in the older literature precludes their positive identification. These older reports are listed under Unidentified Anisakidae.

Anisakis sp. larva

Location: body cavity, viscera, mesenteries, musculature

Hosts: *Clupea harengus harengus* (1, 3, 7, 10, 11, 14, 20, 23, 30, 32, 33, 34, 40, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 73, 74, 75, 76, 77, 80, 81, 90, 91, 92)

C. harengus pallasi (2, 4, 5, 6, 8, 9, 12, 13, 16, 18, 19, 21, 22, 24, 26, 27, 28, 29, 31, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 65, 78, 79, 82, 83, 84, 85, 86, 87, 88, 89, 93)

C. harengus (15, 17, 26, 46, 48, 49, 50, 59, 66, 71, 72)

Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Barents Sea, Greenland Sea, Norwegian Sea, White Sea), NE Pac, NW Pac

Records: 1. Heller 1949 (NW Atl); 2. Margolis 1952 (NE Pac); 3. Scott 1953 (NW Atl); 4. Gustafson 1953 (NE Pac); 5. Shulman and Shulman-Albova 1953 (White Sea); 6. Bishop and Margolis 1955 (NE Pac); 7. Polyansky 1955 (Barents Sea); 8. Polyansky and Shulman 1956 (White Sea); 9. Shulman 1956 (White Sea); 10. Sindermann 1957a (NW Atl), 11. 1963 (NW Atl); 12. Zhukov 1960b (NW Pac); 13. Strelkov 1960 (NW Pac); 14. Berland 1961 (Norwegian Sea), 15. 1962 (unspecified locality);[31] 16. Skrjabina 1963 (NW Pac); 17. Kuipers 1964 (unspecified locality);[31] 18. Otsuru et al. 1965 (NW Pac); 19. Otsuru et al. 1967 (NW Pac); 20. Roskam 1966 (NE Atl); 21. Kobayashi et al. 1966 (NW Pac); 22. Sano 1966 (NW Pac); 23. Vik 1966 (unspecified locality);[32] 24. Oshima 1966 (unspecified locality);[33] 25. Nygard 1967 (unspecified locality);[31] 26. Arai 1967a (NE Pac), 27. 1969 (NE Pac); 28. Oyanagi 1967 (NW Pac); 29. Okumura 1967 (NW Pac); 30. Polak 1966 (unspecified locality);[31] 31. Yamaguchi et al. 1968 (NW Pac); 32. Khalil 1968a (NE Atl), 33. b (NE Atl), 34. 1969 (NE Atl); 35. Ichihara et al. 1968 (NW Pac); 36. Kato et al. 1968 (NW Pac); 37. Koga et al. 1968 (NW Pac); 38. Otsuru 1968a (NW Pac), 39. b (NW Pac); 40. Anon. 1969 (NE Atl); 41. Kagei 1969 (NW Pac); 42. Hagiwara et al. 1969 (NW Pac); 43. Shiraki 1969 (NW Pac), 44. 1974 (NW Pac); 45. Koyama et al. 1969 (NW Pac); 46. Ruitenberg and Roskam 1969 (unspecified locality);[31] 47. Young and Lowe 1969 (NE Atl); 48. Gibson 1970 (unspecified locality);[31] 49. Andreassen 1970 (unspecified locality);[31] 50. Andreassen and Jørring 1970 (unspecified locality);[31] 51. Muravev 1970a (NE Atl), 52. b (Greenland Sea, Norwegian Sea); 53. Kagei et al. 1971 (NW Atl); 54. Hodder and Parsons 1971 (NW Atl); 55. Parsons and Hodder 1971a (NW Atl), 56. b (NW Atl), 57. 1974 (NW Atl); 58. Davey 1972a (NE Atl), 59. b (unspecified locality);[31] 60. Reimer and Jessen 1972 (NE Atl); 61. Anon. 1972 (NE Atl); 62. Lubieniecki 1972 (Baltic Sea), 63. 1974 (NW Atl); 64. Rokicki 1972 (Baltic Sea), 65. 1973 (Baltic Sea, NE Atl, NW Pac); 66. Priebe et al. 1973 (unspecified locality); 67. Dornheim 1973 (NW Atl); 68. Sluiters 1973 (NE Atl), 69. 1974 (NE Atl); 70. Strzyzewska and Popiel 1974 (Baltic Sea); 71. Schulz 1974 (unspecified locality);[34] 72. Grabda 1974c (unspecified locality); 73. Smith 1974 (NE Atl); 74. Anon. 1974 (NE Atl); 75. Anon. 1975 (NE Atl); 76. Smith and Wootten 1975 (NE Atl); 77. MacKenzie 1975a (NE Atl); 78. Dailey 1975 (NE Pac); 79. Ono 1975 (unspecified locality);[33] 80. Möller 1975 (Baltic Sea), 81. 1978 (Baltic Sea); 82. Kulachkova 1976a (White Sea), 83. b (White Sea), 84. c (White Sea), 85. 1978 (White Sea), 86. 1980 (White Sea); 87. Hoskins et al. 1976 (NE Pac); 88. Hauck 1977 (NE Pac); 89. Hauck and May 1977 (NE Pac); 90. Meyers 1978 (NW Atl); 91. van Banning and Becker 1978 (NE Atl); 92. Jackson et al. 1978 (NW Atl); 93. Pushnikova and Pushnikov 1981 (NW Pac)

Remarks: Many of the above records were given as *Anisakis* sp. Type I larva, a form now recognized as *A. simplex* (see Pippy and van Banning 1975; Beverley-Burton et al. 1977). Species of *Anisakis* other than *A. simplex* have not been shown to occur in herring although the distributions of *A. typica* (Diesing, 1860) and *A. physeteris* Baylis, 1923 in their definitive hosts overlap that of *C. harengus* (Davey 1971).

Contracaecum osculatum (Rudolphi, 1802) Baylis, 1920 (larva)

Location: liver

Host: *Clupea harengus harengus*

Dist: Baltic Sea

Records: Fagerholm 1978, 1982

Remarks: Fagerholm (1982) notes that larval *C. osculatum* have frequently been confused with *Hysterothylacium aduncum*. Records of *H. aduncum* from the liver of Baltic herring are probably based on misidentification of this species.

Contracaecum rudolphii Hartwich, 1964 (larva)

Location: not specified

Host: *Clupea harengus harengus*

Dist: NE Atl and/or Baltic Sea

Record: Hartwich 1964

Remarks: Based on studies by previous authors Hartwich (1964) considered *C. rudolphii* to occur in Atlantic herring. No original reports have been made under this name.

Contracaecum siluriglandis (von Linstow, 1883) Dogiel and Bykhovsky, 1934 (larva)

Location: wall of intestine

Host: *Clupea harengus harengus*

Dist: Aral Sea

[31] *Anisakis* sp. reported by the indicated authors were probably from herring originating from the northeastern Atlantic Ocean.

[32] Locality was given only as Scandio-Atlantic by Vik (1966).

[33] Records of Oshima (1966) and Ono (1975) are probably from the northwestern Pacific Ocean.

[34] *Anisakis* sp. reported by Schulz (1974) was from herring purchased from a fish vendor in Germany.

Record: Osmanov 1971

Remarks: Bykhovskaya-Pavlovskaya et al. (1962) note that this species is the larval form of *C. spiculigerum* [= *C. rudolphii*].

Contracaecum spp. larva

Includes: *Contracaecum spiculigerum* of Walton, 1928[35]
Nematoda gen. sp. of Rosenthal, 1966[36]

Location: viscera, body cavity, mesenteries, intestine

Hosts: *Clupea harengus harengus* (1, 5, 9, 10, 11, 16, 17, 20, 22, 23)
C. harengus pallasi (2, 3, 4, 7, 8, 12, 13, 14, 15, 18, 19, 21, 24, 25, 26, 27, 28, 29)
C. harengus (6)

Dist: NE Atl, NW Atl, E Pal (Greenland Sea, Norwegian Sea, White Sea), NE Pac, NW Pac, E Ber Sea, W Ber Sea

Records: 1. Walton 1928 (NW Atl); 2. Smedley 1934 (NE Pac);[37] 3. Margolis 1952 (NE Pac); 4. Gustafson 1953 (NE Pac); 5. van Thiel et al. 1960 (NE Atl); 6. Berland 1962 (unspecified locality);[38] 7. Zhukov 1963 (W Ber Sea);[39] 8. Kobayashi et al. 1966 (NW Pac); 9. Rosenthal 1966 (experimental — NE Atl), 10. 1967 (experimental — NE Atl); 11. Roskam 1967 (NE Atl); 12. Arai 1967a (NE Pac), 13. 1969 (NE Pac); 14. Koga et al. 1968 (NW Pac); 15. Kato et al. 1968 (NW Pac); 16. Khalil 1968a (NE Atl), 17. 1969 (NE Atl); 18. Hagiwara et al. 1969 (NW Pac); 19. Koyama et al. 1969 (NW Pac); 20. Anon. 1969 (NE Atl); 21. Kikuchi et al. 1970 (NW Pac); 22. Muravev 1970b (Greenland Sea, Norwegian Sea); 23. Reimer and Jessen 1972 (NE Atl); 24. Shiraki 1974 (NW Pac); 25. Dailey 1975 (NE Pac); 26. Arthur 1978 (NE Pac, E Ber Sea); 27. Arthur and Arai 1980a (NE Pac, E Ber Sea), 28. b (NE Pac); 29. Kulachkova 1980 (White Sea)

Remarks: Most of the records of *Contracaecum* sp. from *Clupea harengus* are probably referable to *Hysterothylacium aduncum* (Rudolphi, 1802).

Hysterothylacium aduncum (Rudolphi, 1802) Deardorff and Overstreet, 1981 (adult and larva)

Syn: *Contracaecum aduncum* (Rudolphi, 1802)
Contracaecum clavatum (Rudolphi, 1809)
Contracaecum hypomesi (Fujita, 1932)
Thynnascaris adunca (Rudolphi, 1802)

Location: stomach, intestine, mesenteries, viscera, body cavity

Hosts: *Clupea harengus harengus* (2, 3, 5, 10, 11, 14, 15, 16, 17, 18, 19, 21, 22, 26)
C. harengus pallasi (1, 4, 6, 8, 9, 12, 13, 20, 23, 24, 25)
C. harengus (7)

Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Barents Sea, Norwegian Sea, White Sea), NE Pac, NW Pac, E Ber Sea, W Ber Sea

Records: 1. Fujita 1932 (NW Pac); 2. Markowski 1933 (Baltic Sea); 3. Punt 1942 (NE Atl); 4. Shulman and Shulman-Albova 1953 (White Sea); 5. Polyansky 1955 (Barents Sea); 6. Akhmerov 1955 (NW Pac); 7. Löliger-Müller 1955 (unspecified locality);[40] 8. Shulman 1956 (White Sea); 9. Polyansky and Shulman 1956 (White Sea); 10. Petrushevsky 1957 (Baltic Sea); 11. Berland 1961 (Norwegian Sea); 12. Zhukov 1963 (W Ber Sea); 13. Popova and Valter 1965 (White Sea); 14. Muravev 1970a (NE Atl); 15. Rokicki 1973 (Baltic Sea), 16. 1975 (Baltic Sea); 17. Hartwich 1975 (NE Atl, Baltic Sea); 18. Gaevskaya 1977 (Baltic Sea); 19. Gaevskaya and Umnova 1977 (NW Atl); 20. Arthur 1978 (NE Pac, E Ber Sea); 21. Sjöblom and Kuittinen 1978a (Baltic Sea), 22. b (Baltic Sea); 23. Arthur and Arai 1979 (NE Pac), 24. 1980a (NE Pac, E Ber Sea), 25. b (NE Pac); 26. Fagerholm 1982 (Baltic Sea)

Remarks: Sheenko and Pozdnyakov (1981) reviewed the species of *Contracaecum* described by Fujita (1932), considering *C. hypomesi* a synonym of *H. aduncum*.

Phocascaris sp. larva

Location: not specified

Host: *Clupea harengus harengus*

Dist: Baltic Sea

Records: Sjöblom and Kuittinen 1976, 1978a, b

Remarks: Fagerholm (1982) notes that the above records are probably based on misidentification of *Contracaecum osculatum*.

Pseudoterranova decipiens (Krabbe, 1878) Gibson and Colin, 1982 (larva)

Syn: *Phocanema decipiens* (Krabbe, 1878)
Porrocaecum decipiens (Krabbe, 1878)
Terranova decipiens (Krabbe, 1878)

Location: body cavity, liver [musculature]

Hosts: *Clupea harengus harengus* (1)
C. harengus pallasi (2, 4, 5)
C. harengus (3)

Dist: NW Atl, E Pal (White Sea)

Records: 1. Walton 1928 (NW Atl);[41] 2. Shulman and Shulman-Albova 1953 (White Sea); 3. Löliger-Müller 1955 (unspecified locality);[42] 4. Polyansky and Shulman 1956 (White Sea); 5. Shulman 1956 (White Sea)

Pseudoterranova sp. larva

Syn: *Phocanema* sp. auctorum
Porracaecum sp. auctorum
Terranova sp. auctorum

Location: musculature

Host: *Clupea harengus pallasi*

Dist: NE Pac, NW Pac, E Pal (White Sea)

Records: Strelkov 1960 (NW Pac); Dailey 1975 (NE Pac); Kulachkova 1980 (White Sea)

[35]The report of Walton (1928) was based on examination of material from the Leidy collection which was labeled *Agamonema capsularia*. Hartwich (1964) considered *Ascaris spiculigera* Rudolphi, 1809 a synonym of *Contracaecum microcephalum* (Rudolphi, 1809). However, many reports of *C. spiculigerum* were referred to *C. rudolphii*. Dollfus (1970) notes that reexamination of Leidy's specimens is necessary to determine which species is involved.

[36]Unidentified nematodes reported from Atlantic herring by Rosenthal (1966) were later (Rosenthal 1967) assigned to *Contracaecum sp.*

[37]Material reported as *Contracaecum* sp. by Smedley (1934) from Pacific herring apparently included specimens of *Anisakis*.

[38]*Contracaecum* sp. reported by Berland (1962) were from salt herring which probably originated from the northeastern Atlantic Ocean.

[39]Material listed as *Contracaecum* sp. from *Clupea harengus pallasi* in the Host–Parasite list of Zhukov (1963) was apparently reported as *Contracaecum aduncum* (syn. of *Hysterothylacium aduncum*) in his text.

[40]The report of Löliger-Müller (1955) of *Contracaecum clavatum* (syn. of *Hysterothylacium aduncum*) was from herring of unspecified origin examined in Leipzig, East Germany.

[41]Material reported from Atlantic herring as *Porrocaecum decipiens* (syn. of *Pseudoterranova d.*) from the Leidy collection by Walton (1928) was labeled *Agamonema capsularia*.

[42]Nematodes reported as *Porracaecum decipiens* by Löliger-Müller (1955) were from herring of unspecified origin examined in Leipzig, East Germany.

Raphidascaris acus (Bloch, 1779) Ralliet and Henry, 1915
Syn: *Ascaris acus* Bloch, 1779
Location: intestine, viscera
Host: *Clupea harengus harengus*
Dist: NE Atl, NW Atl
Records: Bellingham 1844 (NE Atl); Jackson et al. 1978 (NW Atl)
Remarks: Dollfus (1956, 1970) questioned the validity of Bellingham's (1844) report of this species. The tentative identification of larval *R. acus* from the viscera of herring by Jackson et al. (1978) also requires ve ification. *Raphidascaris acus* is typically a parasite of freshwater fishes.

Raphidascaris sp. larva
Location: not specified
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Kato et al. 1968

Thynnascaris sp. [larva?]
Location: viscera and/or musculature
Host: *Clupea harengus harengus*
Dist: NW Atl
Record: Jackson et al. 1978
Remarks: The above report is probably referable to *Hysterothylacium*.

Anisakidae gen. spp. larva
Includes: Anisakinae auct.
Ascaris capsularia (Rudolphi, 1802)
Ascaris clupeae van Beneden, 1871
Ascaris clupearum Fabricius, 1794
Ascaris gracilescens Rudolphi, 1819
Ascaris sp. of Linton, 1901
Agamonema capsularia (Rudolphi, 1802)
Capsularia halecis (Gmelin, 1790)
Cucullanus halecis Fabricius, 1794
Filaria capsularia Rudolphi, 1802
Filaria piscium (Rudolphi, 1809)
Filocapsularia communis Deslongchamps, 1824
Gordius harengum Bloch, 1782
Gordius marinus Linnaeus, 1767
Gordius sp. auct.
Unidentified ascarids auct.
Location: body cavity, mesenteries, viscera, intestine
Hosts: *Clupea harengus harengus* (1, 13, 17, 20, 22, 24, 25, 26, 30, 31, 32, 33, 34, 37)
C. harengus pallasi (35, 36, 38)
C. harengus (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 18, 19, 21, 23, 27, 28, 29)
Dist: NE Atl, NW Atl, Baltic Sea, E Pal (Norwegian Sea), NW Pac
Records: 1. Linnaeus 1767 (NE Atl), 2. 1789 (unspecified locality);[43] 3. Guettard 1768 (unspecified locality);[44] 4. Beckmann 1769 (unspecified locality),[45] 5. 1770 (unspecified locality); 6. Walch 1778 (unspecified locality);[46] 7. Bloch 1782 (unspecified locality);[47] 8. Fabricius 1794 (unspecified locality);[48] 9. Zeder 1800 (unspecified locality);[46] 10. Nöel 1807 (unspecified locality);[49] 11. Rudolphi 1802 (unspecified locality), 12. 1809 (unspecified locality), 13. 1819 (Baltic Sea);[50] 14. Deslongchamps 1824 (unspecified locality);[49] 15. Creplin 1839 (unspecified locality),[51] 16. 1846 (unspecified locality); 17. Bellingham 1844 (NE Atl); 18. Krøyer 1846–49 (unspecified locality) (original ?); 19. Cuvier and Valenciennes 1847 (unspecified locality) (original ?); 20. Leidy 1857 (NW Atl); 21. Cobbold 1866 (unspecified locality);[52] 22. van Beneden 1871 (NE Atl); 23. Mühling 1898 (unspecified locality);[53] 24. Linton 1901a (NW Atl); 25. Giard 1903 (NE Atl);[54] 26. Nicoll 1907 (NE Atl); 27. Baylis 1916 (unspecified locality);[52] 28. Martin 1921 (unspecified locality);[55] 29. Jahnel 1940 (unspecified locality);[56] 30. Rees 1953 (Norwegian Sea);[57] 31. Sindermann 1957a (NW Atl), 32. 1959 (NW Atl), 33. 1961a (NW Atl), 34. 1965 (NW Atl); 35. Otsuru et al. 1967 (NW Pac); 36. Yoshimura 1966 (NW Pac); 37. Jackson et al. 1978 (NW Atl); 38. Myers 1979 (NE Pac)
Remarks: Walton (1928) identified as *Porrocaecum decipiens* (syn. of *Pseudoterranova*) and *Contracaecum spiculigerum* (syn. of *C. rudolphii*) material from the collection of Joseph Leidy which was labeled *Agamonema capsularia*. It is uncertain whether these specimens were reported as "*Agamonema capsularia* Diesing?" by Leidy (1857).

[43]Linnaeus (1789) reported the presence of *Gordius marinus* in *Clupea harengus* from Sweden.

[44]Guettard (1768) reported the occurrence of unidentified ascarid nematodes in the testis of herring from Paris, France.

[45]Beckmann (1769) reported the occurrence of *Gordius marinus* in herring from an unspecified locality and later (Beckmann 1770), probably in reference to his earlier record, noted the presence of *Gordius* in the milt of Dutch herring.

[46]Records of Walch (1778) of *Gordius* and of Zeder (1800) of *Capsularia halecis* were probably from herring originating in German waters.

[47]Bloch (1782) reported *Gordius harengum* from the testis of herring examined in Germany.

[48]Fabricius (1794) reported the presence of *Cucullanus halecis* and *Ascaris clupearum* on the pyloric caeca and intestine of herring examined in Copenhagen, Denmark.

[49]Records of Noël (1807) of *Gordius marinus* and of Deslongchamps (1824) for *Filocapsularia communis* were probably from herring originating in French waters.

[50]Rudolphi (1819) reported *Filaria capsularia* from herring from Gryphiae. Dollfus (1970) gave the locality for this record as Griefswald, East Germany, which is situated on the Baltic Sea.

[51]The report of *Ascaris gracilescens* by Creplin (1839) was from herring considered by Dollfus (1970) to have been examined at Griefswald, East Germany, and thus probably of Baltic origin.

[52]The specimens reported as *Filaria piscium* from the abdomen of *Clupea harengus* by Cobbold (1866) were contained in the Museum of the Royal College of Surgeons of England; those reported as *Ascaris capsularia* by Baylis (1916) were contained in the British Museum (Natural History). Both reports probably pertain to herring originating from the northeastern Atlantic Ocean.

[53]The specimens reported as *Agamonema capsularia* from *Clupea harengus* by Mühling (1898) were contained in the Museum of the University of Konigsberg and were thus probably from herring originating from the Baltic Sea.

[54]Dollfus (1970) notes that *Ascaris clupeae* of Giard, 1903 was probably *Contracaecum aduncum* (syn. of *Hysterothylacium a.*).

[55]The specimens reported as ascarid larvae by Martin (1921) were from herring received from a coworker in Bergen, Norway and were thus probably from the northeastern Atlantic Ocean. Dollfus (1970) considered this report probably to be referable to *Anisakis simplex*.

[56]The specimens reported as *Ascaris capsularia* by Jahnel (1940) were from herring of unknown origin examined in Vienna, Austria. Khalil (1969) considered this report probably to be referable to *Anisakis* sp. type I larvae (= *A. simplex*).

[57]Specimens reported by Rees (1953) were considered to be either *Anisakis* or *Porrocaecum* [= *Pseudoterranova*] larvae.

ORDER SPIRURIDA

Superfamily APROCTOIDEA

Family DESMIDOCERCIDAE

Desmidocercella numidica (Seurat, 1920) Yorke and Maplestone, 1926 (larva)
Syn: *Desmidocerca numidica* Seurat, 1920
Site: eye
Host: *Clupea harengus*
Dist: unspecified [Baltic Sea ?]
Record: Bezubik 1956

Superfamily HABRONEMATOIDEA

Family CYSTIDICOLIDAE

Ascarophis pacificus Zhukov, 1960
Location: [stomach]
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Strelkov 1960

Cystidicola farionis Fischer, 1798
Location: swim bladder
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Arro 1964, Fagerholm 1982
Remarks: *Cystidicola farionis* is typically a freshwater parasite of salmonid fishes.

Spirurida of Undetermined Position

Spirurida gen. spp. larva
Location: stomach wall, intestine ?
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a
Remarks: Larval nematodes reported as Spirurida gen. sp. larvae type I by Arthur and Arai (1980a) have since been noted to be identical with Type X spirurid larvae of Hasegawa (1978).

ORDER OXYURIDA

Superfamily OXYUROIDEA

Oxyuroidea gen. sp. larva
Location: gill wash
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a

Nematoda of Undetermined Species

Nematoda gen. spp.
Includes: "vermiculi" of van Leeuwenhoek, 1697 (partim)
"Gordii" of Martin, 1760
Location: body cavity, viscera, mesenteries, stomach
Hosts: *Clupea harengus harengus* (3, 4, 7, 8, 9, 10, 11)
C. harengus pallasi (5, 6, 7)
C. harengus (1, 2)
Dist: NE Atl, NW Atl, Baltic Sea, NE Pac, NW Pac
Records: 1. van Leeuwenhoek 1697 (unspecified locality);[58] 2. Martin 1760 (unspecified locality); 3. Linton 1901b (NW Atl); 4. Manter 1926 (NW Atl); 5. Layman 1930 (NW Pac); 6. Robinson et al. 1968b (NE Pac); 7. Priebe 1971 (unspecified locality); 8. Molloy 1970 (NE Atl);[59] 9. Lubieniecki 1972 (Baltic Sea); 10. Dornheim 1973 (NW Atl);[59] 11. Schultz 1974 (NE Atl)[59]

[58]Nematodes reported by van Leeuwenhoek (1697) were from herring purchased in Amsterdam.

PHYLUM ACANTHOCEPHALA

ORDER EOACANTHOCEPHALA

Family NEOECHINORHYNCHIDAE

Neoechinorhynchus rutili (O. F. Müller, 1780) Hamann, 1892
Location: [intestine]
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Gaevskaya 1977, 1979
Remarks: *Neoechinorhynchus rutili* is typically a parasite of freshwater fishes.

ORDER PALEACANTHOCEPHALA

Superfamily ECHINORHYNCHOIDEA

Family ECHINORHYNCHIDAE

Acanthocephalus clavula (Dujardin, 1845) Grabda-Kazubska and Chubb, 1968
Syn: *Echinorhynchus clavula* Dujardin, 1845
Location: intestine
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Forssell 1905
Remarks: Grabda-Kazubska and Chubb (1968) indicate that the occurrence of *A. clavula* in the Baltic area has not been substantiated. Many reports under the name *Echinorhynchus clavula* from this area were referred to *E. borealis* von Linstow, 1901 by Grabda-Kazubska and Ejsymont (1969). Since Forssell's (1905) report of *E. clavula* from *Clupea harengus* was given without description or accompanying figures the identity of this material remains equivocal. *Acanthocephalus clavula* is typically a parasite of freshwater fishes.

Acanthocephalus lucii (O. F. Müller, 1776) Lühe, 1911
Location: intestine
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Arro 1964
Remarks: Golvan (1969) indicated the occurrence of *A. lucii* in *Clupea harengus* to be questionable. *Acanthocephalus lucii* is typically a parasite of freshwater fishes.

Echinorhynchus gadi Zoega in O. F. Müller, 1776
Syn: *Echinorhynchus acus* Rudolphi, 1802
Echinorhynchus angustatus f. *Laborum* Olsson, 1893[60]
Location: intestine
Hosts: *Clupea harengus harengus* (1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15, 16)
C. harengus pallasi (10, 11, 13, 17, 18)

[59]Nematodes reported by Molloy (1970) and Schultz (1974) from Atlantic herring were assumed to be *Anisakis* and/or *Contracaecum*. Those reported by Dornheim (1973) were noted to include representatives of *Anisakis*.

[60]Lundström (1942) redetermined *E. angustatus* forma *Laborum* Olsson, 1893 to be *E. gadi*.

Dist: NE Atl, Baltic Sea, E Pal (White Sea), NE Pac, NW Pac
Records: 1. Olsson 1893 (Baltic Sea); 2. Schneider 1902b (Baltic Sea); 3. Giard 1903 (NE Atl); 4. Forssell 1905 (Baltic Sea); 5. Levander 1909 (Baltic Sea); 6. Jääskelainen 1921 (Baltic Sea);[61] 7. Markowski 1933 (Baltic Sea); 8. Lundström 1942 (Baltic Sea); 9. Popiel 1951 (Baltic Sea); 10. Shulman and Shulman-Albova 1953 (White Sea); 11. Shulman 1956 (White Sea); 12. Petrushevsky 1957 (Baltic Sea); 13. Strelkov 1960 (NW Pac); 14. Rokicki 1973 (Baltic Sea), 15. 1975 (Baltic Sea); 16. Gaevskaya 1977 (Baltic Sea); 17. Arthur 1978 (NE Pac); 18. Arthur and Arai 1980a (NE Pac)

Echinorhynchus salmonis O. F. Müller, 1784
Syn: *Echinorhynchus phoneix* Schneider, 1903
Location: intestine
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Schneider 1903; Nybelin 1924; Petrushevsky 1957
Remarks: *Echinorhynchus salmonis* is typically a parasite of freshwater fishes.

Family POMPHORHYNCHIDAE

Pomphorhynchus kostylewi Petrochenko, 1956
Location: intestine
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Rokicki 1973, 1975[62]
Remarks: *Pomphorhynchus kostylewi* is typically a parasite of freshwater fishes.

Pomphorhynchus laevis (Zoega in O. F. Müller, 1776) Van Cleave, 1924
Location: intestine, body cavity [?]
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Lundström 1942; Petrushevsky 1957; Petrushevsky and Petrushevskaya 1960; Gaevskaya 1979 (original ?)
Remarks: *Pomphorhynchus laevis* is typically a parasite of freshwater fishes.

Family RHADINORHYNCHIDAE

Rhadinorhynchus trachuri Harada, 1935
Location: intestine
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a

Serrasentis socialis (Leidy, 1851) Van Cleave, 1924 (juvenile)
Location: abdomen
Host: *Clupea harengus harengus*
Dist: NW Atl
Record: Van Cleave 1924
Remarks: Van Cleave (1924) identified this species from material from the Leidy collection provided by A. Walton which was contained in a vial labeled *Agamonema capsularia*. Leidy did not report *S. socialis* from *Clupea harengus*.

[61]The record of Jääskelainen (1921) appears only in the host–parasite listing.
[62]Record of Rokicki (1975) occurs only in his Table 22.

Superfamily POLYMORPHOIDEA

Family POLYMORPHIDAE

Corynosoma semerme (Forssell, 1904) Lühe, 1911 (juvenile)
Syn: *Echinorhynchus semermis* Forssell, 1904
Echinorhynchus sp. of Levander, 1909[63]
Echinorhynchus strumosum of Schneider, 1902 (partim)
Location: body cavity, mesenteries, intestine
Hosts: *Clupea harengus harengus* (1, 2, 3, 5, 9, 10, 11, 12, 13, 14, 15, 16, 17)
C. harengus pallasi (6, 7, 8)
C. harengus (4)
Dist: Baltic Sea, E Pal (White Sea)
Records: 1. Schneider 1902b (Baltic Sea); 2. Forssell 1905 (Baltic Sea); 3. Levander 1909 (Baltic Sea); 4. Meyer 1931 (unspecified locality) (original?); 5. Lundström 1942 (Baltic Sea); 6. Shulman and Shulman-Albova 1953 (White Sea); 7. Shulman 1956 (White Sea); 8. Polyansky and Shulman 1956 (White Sea); 9. Arro 1964 (Baltic Sea), 10. 1967 (Baltic Sea); 11. Dubnitsky 1968 (Baltic Sea); 12. Rokicki 1973 (Baltic Sea), 13. 1975 (Baltic Sea); 14. Gaevskaya 1977 (Baltic Sea), 15. 1979 (Baltic Sea); 16. Valtonen 1979 (Baltic Sea), 17. 1980 (Baltic Sea)

Corynosoma strumosum (Rudolphi, 1802) Lühe, 1904 (juvenile)
Syn: *Echinorhynchus strumosus* Rudolphi, 1802
Echinorhynchus gibber Olsson, 1893[64]
Location: mesenteries, body cavity, intestine
Hosts: *Clupea harengus harengus* (1, 2, 3, 4, 8, 11, 13, 14)
C. harengus pallasi (5, 6, 7, 9, 10, 12, 15, 16)
Dist: Baltic Sea, E Pal (White Sea), NE Pac, NW Pac, E Ber Sea
Records: 1. Olsson 1893 (Baltic Sea); 2. Forssell 1905 (Baltic Sea);[65] 3. Markowski 1933 (Baltic Sea); 4. Lundström 1942 (Baltic Sea); 5. Shulman and Shulman-Albova 1953 (White Sea); 6. Shulman 1956 (White Sea); 7. Polyansky and Shulman 1956 (White Sea); 8. Petrushevsky 1957 (Baltic Sea); 9. Strelkov 1960 (NW Pac); 10. Skrjabina 1963 (NW Pac); 11. Dubnitsky 1968 (Baltic Sea); 12. Arthur 1978 (NE Pac, E Ber Sea); 13. Valtonen 1979 (Baltic Sea), 14. 1980 (Baltic Sea); 15. Arthur and Arai 1980a (NE Pac, E Ber Sea), 16. b (NE Pac)
Remarks: Material reported as *E. strumosus* from *C. harengus* by Schneider (1902b) and listed as *Corynosoma strumosum* by Jääskelainen (1921) is referred to *Corynosoma semerme* following Dollfus (1956).

Corynosoma villosum Van Cleave, 1953 (juvenile)
Location: mesenteries
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Arthur 1978; Arthur and Arai 1980a

[63]The report of *Echinorhynchus* sp. from *C. harengus* by Levander (1909) was referred to *Corynosoma semerme* by Jääskelainen (1921).
[64]Synonomy following Lundström (1942). Other workers (Lühe 1911; Yamaguti 1963; Golvan 1969) have referred *E. gibber* in part to *Corynosoma semerme* and in part to *C. strumosum*.
[65]Record of Forssell (1905) involves a tentative parasite identification.

Acanthocephala of Undetermined Position

Acanthocephala gen. sp.
Location: intestine
Host: *Clupea harengus pallasi*
Dist: NW Pac
Record: Layman 1930

PHYLUM ARTHROPODA

Class Crustacea

Subclass Branchiura

order arguloidea

Family argulidae

Argulus alosae Gould, 1841
Location: body surface
Host: *Clupea harengus harengus*
Dist: NW Atl
Record: Sindermann 1957a

Argulus coregoni Thorell, 1864
Location: [body surface]
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Records: Petrushevsky 1957; Gaevskaya 1979 (original ?)
Remarks: *Argulus coregoni* is typically a parasite of freshwater fishes.

Subclass Entomostraca

order copepoda

suborder poecilostomatoida

Family bomolochidae

Bomolochus cuneatus Fraser, 1920
Syn: *Parabomolochus cuneatus* (Fraser, 1920)
Location: inner surface of operculum, gills
Host: *Clupea harengus pallasi*
Dist: NE Pac, NW Pac
Records: Fraser 1920 (NE Pac); Markevich 1956 (NW Pac); Vervoort 1964 (NE Pac); Arai 1967a (NE Pac), 1969 (NE Pac); Arthur 1978 (NE Pac); Arthur and Arai 1980a (NE Pac)

Family ergasilidae

Ergasilus sieboldi Nordmann, 1832
Location: gills
Host: *Clupea harengus harengus*
Dist: Baltic Sea
Record: Giesbrecht 1882[66]
Remarks: *Ergasilus sieboldi* is typically a parasite of freshwater fishes.

suborder siphonostomatoida

Family caligidae

Caligus clemensi Parker and Margolis, 1964
Syn: *Caligus gurnardi* of Fraser, 1920 and of Bere, 1930
Location: body surface
Host: *Clupea harengus pallasi*
Dist: NE Pac, E Ber Sea
Records: Fraser 1920 (NE Pac); Bere 1930b (NE Pac); Parker and Margolis 1964 (NE Pac); Arai 1967a (NE Pac), 1969 (NE Pac); Arthur 1978 (NE Pac, E Ber Sea); Arthur and Arai 1980a (NE Pac, E Ber Sea), b (NE Pac)

Caligus elongatus Nordmann, 1832
Syn: *Caligus rapax* auct.
Location: body surface, buccal cavity
Host: *Clupea harengus harengus*
Dist: NE Atl, NW Atl
Records: Bere 1930a (NW Atl); Dollfus 1956 (NE Atl); Sindermann 1957a (NW Atl); Rosenthal 1966 (experimental — NE Atl), 1967 (experimental — NE Atl)

Lepeophtheirus pollachius Bassett-Smith, 1896
Location: buccal cavity
Host: *Clupea harengus harengus*
Dist: NE Atl
Record: Dollfus 1956
Remarks: Dollfus (1956) considered this material to represent a separate form which he named *L. pollachius* form *harengi nobis*.

Family pennellidae

Lernaeenicus sprattae (Sowerby, 1806) Olsson, 1869
Syn: *Lernaeonema monillaris* Milne Edwards, 1840
Location: attached to eye
Host: *Clupea harengus harengus*
Dist: NE Atl
Record: Bassett-Smith 1896
Remarks: Z. Kabata (Pacific Biological Station, Nanaimo, B.C., personal communication) considers *Clupea harengus* to be an atypical host for *L. sprattae*.

Lernaeocera sp.
Location: body surface
Host: *Clupea harengus harengus*
Dist: NE Atl
Records: Rosenthal 1966 (experimental),[67] 1967 (experimental)
Remarks: Z. Kabata (personal communication) considers *Clupea harengus* to be an atypical host for this species.

PHYLUM CHORDATA

SUBPHYLUM VERTEBRATA

Class Agnatha

order petromyzontiformes

Family petromyzontidae

Lampetra ayresi (Günther, 1870) Jordan, Evermann, and Clark, 1930
Location: body surface
Host: *Clupea harengus pallasi*
Dist: NE Pac
Records: Roos et al. 1973; Beamish 1980

[66]The record of *E. sieboldi* from "herringe" by Giesbrecht (1882) appears in the abstract only.

[67]The initial report of this parasite was given by Rosenthal (1966) as a "...copepodite stage of a copepod (presumably a caligid)."

HOST–PARASITE CHECKLIST

***Clupea harengus harengus* Linnaeus** **Atlantic herring**
Syn: *Clupea elongata* Lesueur
Clupea harengus membras Linnaeus
Includes: *Clypea halecis* auct.
Clupea harengus auct.

Apicomplexa
Eimeria clupearum (NE Atl, NW Atl)
E. sardinae (NE Atl, NW Atl, Baltic Sea, Barents Sea)

Microspora
Pleistophora sp. (NW Atl)

Ciliophora
Trichodinidae gen. sp. (NW Atl)

"Protozoa"
Unidentified Sporozoa (Baltic Sea)

Myxozoa
? *Ceratomyxa acadiensis* NW Atl)
C. auerbachi (NE Atl)
Kudoa clupeidae (NE Atl, NW Atl)

Monogenea
Gyrodactyloides baueri (White Sea)
Gyrodactyloides spp. (White Sea)
Gyrodactylus harengi (Baltic Sea, White Sea)
Gyrodactylus sp. (NW Atl)
Lamniscus dogieli (White Sea)
Mazocraeoides georgei (NW Atl)
Mazocraes harengi (NE Atl)

Digenea
Brachyphallus crenatus (NE Atl, NW Atl, Baltic Sea, Barents Sea)
Cryptocotyle lingua metacercaria (NW Atl)
Derogenes varicus (NE Atl, NW Atl, Barents Sea)
Digenea gen. sp. metacercaria (Aral Sea)
Digenea gen. sp. (NE Atl, Baltic Sea)
Diplostomum spathaceum metacercaria (Baltic Sea)
? *Hemiurus appendiculatus* (NE Atl, NW Atl, Baltic Sea)
H. levinseni (NW Atl, Barents Sea)
H. leuhei (NE Atl, Baltic Sea)
H. raabei (Baltic Sea)
Lecithaster confusus (NW Atl, Baltic Sea, Barents Sea)
L. gibbosus (NE Atl, NW Atl, Baltic Sea, Barents Sea)
? *Opechona bacillaris* (NE Atl)
Opecoeloides vitellosus (NW Atl)
? *Parahemiurus merus* (Baltic Sea)
Renicola spp. metacercaria (NE Atl)
Stephanoprora psuedoechinata metacercaria (Baltic Sea)

Cestoda
Abothrium gadi plerocercoid (Baltic Sea)
Bothriocephalus scorpii (NW Atl, Baltic Sea)
Bothriocephalus sp. (Baltic Sea, NW Atl)
Cestoda gen. sp. (NE Atl, Baltic Sea)
Eubothrium crassum (Baltic Sea)
Eubothrium sp. (Baltic Sea)
Grillotia erinaceus plerocercoid (NW Atl)
Lacistorhynchus tenuis plerocercoid (NE Atl, NW Atl)
Proteocephalus sp. (Baltic Sea)
Pseudophyllidea gen. sp. (NW Atl)
Scolex pleuronectis plerocercoid (NE Atl, NW Atl, Baltic Sea, Barents Sea)
Trypanorhyncha gen. sp. plerocercoid (NE Atl, NW Atl)

Nematoda
Anisakidae gen. spp. larva (NE Atl, NW Atl, Baltic Sea, Norwegian Sea)
Anisakis simplex larva (NE Atl, NW Atl, Baltic Sea)
Anisakis sp. larva (NE Atl, NW Atl, Baltic Sea, Barents Sea, Greenland Sea, Norwegian Sea)
Contracaecum osculatum larva (Baltic Sea)
? *C. rudolphii* larva (NE Atl, and/or Baltic Sea)
C. siluriglandis larva (Aral Sea)
Contracaecum sp. larva (NE Atl, NW Atl, Greenland Sea, Norwegian Sea)
Cystidicola farionis (Baltic Sea)
Hysterothylacium aduncum larva (NW Atl, NW Atl, Baltic Sea, Barents Sea, Norwegian Sea)
Nematoda gen. spp. (NE Atl, NW Atl, Baltic Sea)
? *Phocascaris* sp. larva (Baltic Sea)
Pseudoterranova decipiens larva (NW Atl)
? *Raphidascaris acus* (NE Atl)

Acanthocephala
? *Acanthocephalus clavula* (Baltic Sea)
? *A. lucii* (Baltic Sea)
Corynosoma semerme juvenile (Baltic Sea)
C. strumosum juvenile (Baltic Sea)
Corynosoma sp. juvenile (Baltic Sea)
Echinorhynchus gadi (NE Atl, Baltic Sea)
E. salmonis (Baltic Sea)
Neoechinorhynchus rutili (Baltic Sea)
Pomphorhynchus kostylewi (Baltic Sea)
P. laevis (Baltic Sea)
Serrasentis socialis juvenile (NW Atl)

Arguloidea
Argulus alosce (NW Atl)
A. coregoni (Baltic Sea)

Copepoda
Caligus elongatus (NE Atl, NW Atl)
Ergasilus sieboldi (Baltic Sea)
Lepeophtheirus pollachius (NE Atl)
Lernaeenicus sprattae (NE Atl)
Lernaeocera sp. (NE Atl)

***Clupea harengus pallasi* Valenciennes** **Pacific herring**
Syn: *Clupea pallasi* Valenciennes
Clupea harengus pallasi n. *maris-albi* Berg
Clupea harengus pallasi n. *suworowi* Rabinerson
Includes: *Clupea harengus* auct.

Apicomplexa
Eimeria clupearum (NE Pac, E Ber Sea)
E. nishin (NE Pac, NW Pac, E Ber Sea)
E. sardinae (White Sea)

Microspora
Microsporida gen. sp. (NE Pac)

Ciliophora
Trichodina ploveri (W Ber Sea)

Myxozoa

Ceratomyxa auerbachi (NE Pac)
C. orientalis (White Sea, NW Pac)
Chloromyxum sp. (White Sea)
Leptotheca sp. (NE Pac)
Ortholinea orientalis (White Sea, NE Pac)

Monogenea

Gyrodactyloidea gen. spp. (White Sea, NE Pac)
Gyrodactyloides baueri (White Sea, W Ber)
G. petruschewskii (White Sea, NE Pac, W Ber)
Gyrodactyloides spp. (White Sea)
Gyrodactylus cyclopteri (White Sea)
G. flesi (White Sea)
G. gerdi (White Sea)
G. groenlandicus (White Sea)
G. harengi (White Sea, NE Pac, W Ber)
G. pterygialis (White Sea)
G. pungitii (White Sea)
G. robustus (White Sea, W Ber)
Gyrodactylus spp. (White Sea)
Lamniscus dogieli (White Sea, W Ber)

Digenea

Brachyphallus crenatus (White Sea, NE Pac, NW Pac, E Ber, W Ber)
Derogenes varicus (White Sea, NW Pac)
Digenea gen. sp. metacercaria (E Ber)
Digenea gen. sp. (NE Pac, NW Pac)
Diplostomum spathaceum metacercaria (White Sea)
Galactosomum phalacrocoracis metacercaria (NE Pac)
Hemiurus levinseni (NE Pac, NW Pac)
Lecithaster confusus (White Sea)
L. gibbosus (NE Pac, E Ber, W Ber)
Lecithaster sp. (NW Pac)
Parahemiurus merus (NE Pac)
Podocotyle atomon (NW Pac)
P. reflexa (NW Pac)
Prosorhynchoides basargini metacercaria (NE Pac, E Ber)
P. gracilescens metacercaria (NW Pac)
Pronoprymna petrowi (NE Pac, E Ber, W Ber)
Rhipidocotyle sp. metacercaria (NE Pac)

Cestoda

Bothriocephalus scorpii (W Ber)
Eubothrium crassum (White Sea, W Ber)
Eubothrium sp. (White Sea)
Nybelinia surmenicola plerocercoid (E Ber)
Pseudophyllidea gen. sp. (White Sea, NW Pac)
Scolex pleuronectis plerocercoid (White Sea, NE Pac, NW Pac, W Ber)
Trypanorhyncha gen. sp. plerocercoid (NE Pac)

Nematoda

Anisakidae gen. spp. larva (NW Pac)
Anisakis simplex larva (NE Pac, NW Pac, E Ber)
Anisakis sp. larva (White Sea, NE Pac, NW Pac)
Ascarophis pacificus (NW Pac)
Contracaecum sp. larva (NE Pac, NW Pac, E Ber, W Ber)
Hysterothylacium aduncum (White Sea, NE Pac, NW Pac, E Ber, W Ber)
Nematoda gen. spp. (NE Pac, NW Pac)
Oxyuroidea gen. sp. larva (NE Pac)
Pseudoterranova decipiens larva (White Sea)
Pseudoterranova sp. larva (NE Pac, NW Pac)
Raphidascaris sp. larva (NW Pac)
Spirurida gen. spp. larva (NE Pac)

Acanthocephala

Acanthocephala gen. sp. (NW Pac)
Corynosoma semerme juvenile (White Sea)
C. strumosum juvenile (White Sea, NE Pac, NW Pac, E Ber)
C. villosum juveniie (NE Pac)
Echinorhynchus gadi (White Sea, NE Pac, NW Pac)
Rhadinorhynchus trachuri (NE Pac)

Copepoda

Bomolochus cuneatus (NE Pac, NW Pac)
Caligus clemensi (NE Pac, E Ber)

Agnatha

Lampetra ayresi (NE Pac)

***Clupea harengus* Linnaeus**

Includes: *Clupeae harengi*
Clupe hareng

Monogenea

Gyrodactylus sp. (White Sea)

Digenea

Hemiurus appendiculatus (–)
H. luehei (–)
? *Neophasis oculata* (–)

Cestoda

? *Ligula intestinalis* plerocercoid (–)
Scolex pleuronectis plerocercoid (–)

Nematoda

Anisakidae gen. spp. (–)
Anisakis sp. larva (–)
Contracaecum sp. larva (–)
Desmidocercella numidica (–)
Nematoda gen. sp. (–)
Hysterothylacium aduncum larva (–)
Pseudoterranova decipiens larva (–)

Acanthocephala

Corynosoma semerme (–)

Erroneous Listings

A number of species have erroneously been listed in papers and monographs and by abstracting services as having been reported from *Clupea harengus*. The Index Catalogue of Medical and Veterinary Zoology (suppl. 18, part 7, p. 163) lists, in reference to Sanzin (1965) *Hexamita salmonis* (Moore, 1923) from *C. harengus*. Although Sanzin did examine herring for this species no infections were noted. Records of digenetic trematodes from the Black Sea region by Koval (1962) were also (suppl. 15, Parasite-Subject Catalogue: Hosts, p. 41) erroneously listed under *Clupea harengus* due to an incorrect assignment of the common name "oseledest" to this species rather than to the correct host, *Alosa kessleri pontica*, the Black Sea shad. Also attributed to *C. harengus* (Index-Catalogue Med. Vet. Zool., Subjects: Trematoda and Trematode Diseases, Part I: Supergenera and Genera A and B, p. 153) and repeated by Yamaguti (1971) is an erroneous listing attributing to Smirnova (1957) (date listed as 1958) a report of *Bucephalus polymorphus* Baer, 1827 from *C. harengus membras*. The correct host for this report is actually *Clupeonella delicatula tscharcalensis*. Records of Kulkarni (1969, 1970) of Monogenea from *Clupea rarengus* [sic] from India are considered to be the result of host misidentification. Previously mentioned are the possibly erroneous listings from herring of *Opechona bacillaris* (Molin, 1859) by Ward and Fillingham (1934) and of *Distoma oculatum* Levinsen, 1881 and *Ligula digramma* Creplin, 1839 by von Linstow (1889). Additionally, the presumptive diagnosis of *Myxosoma cerebralis* (Hofer, 1903) from Baltic herring by Dannevig and Hansen (1952) is undoubtedly erroneous.

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